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CONTENTS

King's Birthday Honours List

A FIRST selection of honours of transport and industrial interest from the King's Birthday Honours List was given in our last week's issue, and a further selection appears on page 689 this week. Sir Cyril Hurcomb, Chairman of the British Transport Commission, is created a Baron, the first time this honour has been conferred on a transport man for a number of years. An outstanding railway industrialist, Mr. Archibald J. Boyd, Chairman of the Railway Carriage & Wagon Builders' Association and Managing Director of the Metropolitan-Cammell Carriage & Wagon Co. Ltd., receives the honour of a Knighthood. Two overseas railwaymen receive the C.M.G., namely, Mr. R. H. Chapman, Railways Commissioner, State of South Australia, and Mr. R. J. Hillard, General Manager of the Sudan Railways; the O.B.E. is received by Mr. T. Davidson, Resident Engineer, East African Railways & Harbours. A number of names from the Ministry of Transport are included in the honours list, among them Mr. P. Faulkner, Marine Under-Secretary, who receives the C.B.; the O.B.E. is conferred on Mr. B. V. Bradforth, Senior Engineer, Mr. C. F. Brown, Principal, Mr. E. H. Edlin, Chief Executive Officer, and Mr. E. W. Godfrey, Railways Traffic Principal. Railwaymen who receive the M.B.E. are Mr. G. W. Anson, Assistant District Operating Superintendent, Hull; Mr. B. P. Blackburn, District Motive Power Superintendent, Carlisle; Mr. G. Crabtree, District Operating Superintendent, Edinburgh; Mr. A. L. Day, District Traffic Superintendent, District and Piccadilly Lines, London Transport; and Mr. A. C. Eagle, Chief of Freight Section, Southern Region, British Railways.

London Transport Receipts

ABOLITION of petrol rationing, resulting in an increase in the use of motorcars, may lower the receipts of London Transport by £1,000,000 to £1,500,000 in a full year. This estimate was given by Mr. A. B. B. Valentine, Member, London Transport Executive, when the inquiry before the Transport Tribunal into the draft London Area (Interim) Passenger Charges Scheme was resumed last week. When the inquiry began on May 9 the estimated net result of the proposed fare revisions in the London area was shown to increase the gross transport receipts from £74½ million to about £77¼ million in a year. Then came the increase in the duty on oil and petrol, resulting in the estimated additional revenue of £3·2 million being reduced by £1¼ million, and this was followed by a further announcement of an increase in the price of coal, another factor bound to impose a further burden on the railways. This week the case for the British Transport Commission was concluded and elsewhere in this issue appears a summary of evidence given on behalf of the London County Council and other authorities who oppose the scheme. Mr. Arthur Deakin, General Secretary, T. & G.W.U., said that any increase in fares at this time would promote a demand for higher wages.

British Investments in Colombia

ONLY one British company, the Dorada, now operates a railway in Colombia, states *The South American Journal*, but this company in 1949 paid a 6 per cent. dividend, which is an improvement on the 3½ per cent. paid for the preceding year. Of the other two British-owned railways, Colombia Railways & Navigation has ceased transport operations, while the Barranquilla Railway & Pier Company is, in effect, a trust company receiving instalments of the purchase price after sale of the railway to the Government. British investments in Colombian railways now total £1·7 million and have declined fairly steadily from nearly £3 million in the past 25 years; the return in 1949 was 2·7 per cent., much the same as for the previous ten years, though only half the investment bore interest. Total British capital invested in the country in 1949 was £5·3 million and has remained near this figure for the past 20 years. Interest at 3·9 per cent., against 3·8 per cent. for 1948, was borne by some four-fifths of the total, and shows a steady rise since the end of the war.

Another Productivity Team Report

THE latest report* issued by the Anglo-American Council on Productivity deals with the visit to the United States in November last of a team drawn from the British internal combustion engine industry. The report points to important differences between the markets supplied by the industries of the two countries and the effect these differences have on industrial techniques and output. It recognises the considerably higher productivity attained in the U.S.A. and makes some important recommendations, including a revision of the wage structure of the industry, the application of time-study, and also an examination of the apprenticeship system in this country. The team, which was led by Mr. J. R. Bergne-Coupland, of Ruston & Hornsby Limited, carried its researches into a wide field, including the mechanical handling of materials, and the report suggests that the

* Internal Combustion Engines. London: The Anglo-American Council on Productivity, 21, Tothill Street, S.W.1. Price 2s. 6d.

effect of exporting a high proportion of the output of the machine tool industry should be examined. Because of its high export target the industry sends more than one-third of its output overseas. Other recommendations include the training of supervisory staff and the interchange of information on production methods.

Freight Handling on British Railways

BRITISH Railways carry some 1,000,000 tons of freight a day and about 1,000,000 tons of miscellaneous commodities every week. These cover the products of almost every type of factory and are of all shapes and sizes and weights. Though there can be no common solution to the handling problems involved in this service, as what may be sound as a mechanical means of handling one commodity may not be generally applied on a miscellaneous freight chain, methods of dealing with the movement of freight must always aim at eliminating handling as far as possible, and during the past ten years the railways have built up a wide system of rail and road containers with this object in view. When speaking at a luncheon held at the Mechanical Handling Exhibition last week Mr. David Blee, Member of the Railway Executive, referred to the use of mechanical handling appliances in general, and mentioned also that British Railways, in collaboration with shipping interests, are now experimenting with collapsible containers which it is hoped will still further assist in expediting the handling of freight. More rapid progress would be made if greater care was paid to methods of packaging.

American Railway Engineering Association

THE forty-ninth annual convention of the American Railway Engineering Association was held in Chicago on March 14-16, under the presidency of Mr. F. S. Schwinn, Assistant Chief Engineer, Missouri Pacific Lines, with Mr. G. L. Sitton, Assistant Chief Engineer, Southern Railway System, as Vice-President. A new feature of this year's convention was inclusion in the programme of 17 brief addresses, presented in connection with the 110 reports by the 21 standing committees. These dealt with many subjects, such as the economics of railway location and operation, impact and bridge stresses, iron and steel structures, yards and terminals, and the economics of railway labour; many dealt with different parts of the permanent way. Another innovation was a visit to the new research laboratory of the Association of American Railroads on the campus of the Illinois Institute of Technology, to which the New York Central administration ran special trains from Chicago La Salle Street Station for members visiting the laboratory.

Association of American Railroads Laboratory

THE need for more intensive research arising from greatly increased labour costs and prices of materials and the necessity for keeping abreast of the times, prompted the Association of American Railroads to build a new Central Research Laboratory near South Side, Chicago. The new building, now nearly finished, is a two-storey, continuously-glazed structure, 218 ft. long and 50 ft. wide. It includes offices, laboratories for various branches of research, drawing and conference rooms, and in the grounds are tracks and other outdoor equipment for engineering, mechanical, refrigeration, container, and sanitary research work. A basement is equipped for testing and storage. The laboratory is served by a siding from the New York Central main line. There is also a 600-ft. impact testing track for determining the effects of shock on vehicles shunted together at different speeds. Heavy losses arising from damage to the containers in use resulted in provision of a special container laboratory. Otherwise the usual avenues of research will be followed. The ground floor is devoted mainly to mechanical engineering, sanitation, and container research, and the first floor to engineering, refrigeration, and electrical tests and offices, the conference room being on the ground floor.

Metre-, Broad-, Metre-Gauge Conversions

THE original main line of the old Eastern Bengal Railway from Calcutta (Sealdah) to Siliguri—whence Darjeeling is reached by a 2-ft. gauge mountain railway—was of 5-ft. 6-in. gauge as far as the River Ganges and metre gauge beyond. Early in this century the passenger and wagon ferries over that river were replaced by the great Hardinge Bridge and the broad gauge was subsequently extended piecemeal to Siliguri by conversion from metre gauge. In its hey-day the broad-gauge Darjeeling Mail *ex*-Sealdah was the fastest train in India and for many miles continuously was booked at 60 m.p.h. Since Partition, this route has been for about 70 miles in India, then for some 200 miles in Eastern Pakistan, and, finally, for about 40 miles again in Indian territory. Until early January, 1950, however, this final section, though in India, was worked by the Pakistani Eastern Bengal Railway because it was of broad gauge. It is now operated by the Indian Government, having been reconverted to metre gauge during January and linked up, by a temporary pile bridge over the Mahananda River, with the new Assam Rail Link at Siliguri. It is not often that a section of line is built to one gauge, converted to another, and reconverted to its original gauge.

Vapour Dried Sleepers

ELEVEN railways in the U.S.A. are testing in the track oak and gum sleepers artificially seasoned by the vapour drying process. On the Southern Railway, two lengths of the same track have been laid for six years with the same kinds of sleeper, similarly impregnated, but in one length the sleepers were air seasoned and in the other they were vapour dried. The vapour dried sleepers show signs of a much smaller tendency to checking than the air seasoned ones due to the relief from seasoning stresses in the former process. As now used the vapour drying process is completed in from 12 to 14 hr. instead of the several months required for air seasoning. Ordinary preservative-treatment cylinders can be converted for vapour drying in addition to impregnation, and the drying process usually takes place immediately before treatment. It is estimated that the new process will add at least three years to the life of an average hardwood sleeper, and that, taking everything into account, an average annual saving of about $126,000 may be expected after three years of operation of a plant capable of seasoning 600,000 sleepers a year. Experiments are also being carried out with the vapour drying of softwoods.

Spring-borne Motors in Narrow-Gauge Bogies

SPECIAL attention has been given for some years by Swiss manufacturers to the design of power bogies for motor coaches on light and interurban railways. As speed requirements increase, the advantages of fully spring-borne motors become more attractive, and various narrow-gauge bogies have been produced with inside frames that afford support for both sides of the motors. A recent improvement on existing types has been described in *Schweizerische Bauzeitung*. This design, developed by Schweizerische Wagonfabrik (Schlieren) and Oerlikon, employs the Oerlikon disc drive, and some emphasis is laid on the fact that the consequent separation between the motor frame and the gearcase relieves the gears of the heating effects experienced with modern high-speed motors when gearcase and motor frame are in direct contact. The bogie frame is supported on the inside axleboxes by rubber pads, in association with links carried on Silentbloc bushes. The coach underframe rests on the bogie king-pins through the medium of transverse springs. Only 1½ tons (represented by the wheel sets) of the total bogie weight of 4½ tons remains unsprung. The design is an example of how the compactness of the Oerlikon disc drive enables a flexible transmission to be accommodated in a bogie of limited size, and may point towards a time when in some quarters fully spring-borne motors will be accepted as a commonplace of motor coach design rather than a refinement.

Dual Voltage Inter-Running

THE existence of electric traction systems electrified at 660 V. and 1,500 V. within a few miles of one another raises problems to be solved if a through connection is to be attempted. It was therefore interesting to learn from the address by Sir Cyril Hurcomb to the recent I.E.E. convention that experts had advised that inter-running between overhead and third rail presented no difficult technical problems. Although the speaker made no reference to different voltages, it is legitimate to assume that he was not considering only the problem of collection. London Transport trams have been inter-running with overhead and conduit supplies for many years, and between Culoz and Modane on the S.N.C.F. overhead and third rail systems are used jointly. The real problem lies in the different voltages. It may be expected that an arrangement of 750-V. motors in series, series-parallel, and parallel will be advocated with the series and series-parallel connections used on 1,500-V., while on 660-V. the motors will be connected in series-parallel and parallel. One difficulty will be to compensate for the reduction in power due to the operation of 750-V. motors on 660-V. Considerable complications will be involved in the safety measures necessary.

Moving Towards Decentralisation

AT fairly regular intervals since the passage of the Transport Act, 1947, and the establishment of the British Transport Commission and its various Executives, the matter of the degree of centralisation necessary, and of decentralisation desirable, in the transport organisation of this country has been raised. It has been made clear on several occasions by Sir Cyril Hurcomb, Chairman of the British Transport Commission, by Sir Eustace Missenden, Chairman of the Railway Executive, and by other authoritative spokesmen that the original organisation that is still broadly in being was not intended to be immutable. It was evolved as a means of dealing with a very large problem and had to be brought into being in relatively a very short space of time. Some means had to be found of bringing together and administering under a general central direction the major inland transport agencies of the country. Some of these, such as the four main-line railway systems, were already in an advanced stage of organisation, but others, such as the road haulage industry, were very far from that position. Even in the case of the railways, there were considerable divergencies in traditions and practices, as between one major system and another.

It was natural, and perhaps inevitable, because of the need to achieve economy on the railways, and because it was considered that one of the most fruitful sources of savings would be as wide a measure of standardisation as possible, that a considerable degree of centralisation should be imposed at the outset. Only in this way, it was felt, could there be assurance that unified standards throughout the railways would be adopted and adhered to with reasonable speed. Moreover, the desire to achieve economy and the greater user of physical assets, such as locomotives, and rolling stock, by the establishment of common pools, necessarily tended to concentrate power and responsibility at the top, rather than to diffuse the responsibility through the Regions.

The aim always has been stated to be to centralise authority in matters of principle but to decentralise administration. In the early stages of a development as great as that which has been embarked on in the unification of British transport, it can be well understood, however, that, in endeavouring to secure the speedy adoption of standardisation, there has been great temptation to centralise more than the laying-down of principles.

The fact that the responsibilities and authority of the functional Members of the Railway Executive, for example, extend in direct line through the departmental heads in the Regions on matters with which the Member is entrusted, obviously must have been of great assistance in securing the adoption of standard practices, but equally it must have brought into being a good deal of centralised administration on matters of detail as opposed to principle. At any event, in a system such as that now being operated, difficulties must arise sometimes in defining points of principle or administration. The human tendency may often be to pass the matter to the top for decision. Sir Eustace Missenden obviously is alive to this likelihood, for in the article which he contributed to our April 21 issue, he pointed out that "centralisation always enhances the importance of paper work which really dims reality and can be a menace to the administration of an undertaking of the character of a railway." Many railwaymen will find themselves heartily in accord with the Chairman of the Railway Executive and will have noted with keen appreciation his recognition of the fact that one of the problems of the present time is to divorce the two ideas of authority at Executive Headquarters and of the administration of that authority by the Regions.

A good deal of progress has now been made towards unification and standardisation throughout the Regions, and it seems likely that the time is approaching when it may be possible to embark on the second stage in the development of transport organisation in this country. This would be moving towards a greater decentralisation of responsibility. Sir Eustace Missenden, in the article to which we have already referred, foresaw that as the undertaking gets into its stride, and as the new standards are adopted, a greater devolution of responsibility from the Railway Executive to the Regions will be possible. Just what form the decentralisation is likely to take is not yet clear, but a fairly obvious course might be to give greater responsibility for the administration of their Regions to Chief Regional Officers.

As time goes on and the nationalised British Railways become completely unified in their standards, practices and so forth, the calls on the central staff of the Railway Executive will decrease markedly. On the other hand, the need for an effective regional administration may become greater, and it is not impossible to envisage a time at which the administration of the railways may be conducted by an executive committee formed largely of the Chief Regional Officers, somewhat on the lines of the Railway Executive Committee which, in different circumstances, functioned very efficiently during the war years. That is probably looking some way ahead, but there are signs of a movement in that direction.

Transport in Ireland

THE establishment of the new board of Coras Iompair Eireann and the appointment of Mr. G. B. Howden as General Manager of the nationalised transport system of the Republic of Ireland marks the beginning of a new phase. There can be no doubt that the new board faces a difficult task in bringing Irish public transport back to an economic basis, but it enjoys the advantage of being the last of the systems in the British Isles to come under State control. To that extent, at least, it should be able to view its problems in the light of experience gained by its neighbours in attempts to operate on a similar basis. It is unlikely, however, that in practice the new Irish board will be able to learn much either from a study of English or Northern Ireland practice, for the Republic has many transport peculiarities of its own. In dealing with them it enjoys the full support of the Minister for Industry & Commerce, who has made it clear that further legislation will be introduced, if necessary, to deal with matters that may develop when the new system gets into its stride. The Act establishing the new C.I.E. is quite exceptional among contemporary transport legislation in the freedom it accords the board to determine its rates and charges. The wisdom with which this power is exercised may well determine the success or failure of the enterprise.

The membership of the new board tends to follow the general pattern of State transport administrations. The Chairman, Mr. T. E. Courtney, is no stranger to C.I.E., for he took over, at the request of the Government, in February, 1949, when the financial conditon of the old undertaking was grave. He has shown himself to be a

popular and diplomatic chairman. On the new board are represented some of the principal Irish industries—particularly agriculture—and labour interests. Mr. P. J. Floyd, who was formerly an outstanding Traffic Manager of the old Great Southern Railways, has emerged from retirement to give the benefit of his long and wide experience to the new organisation.

The appointment of Mr. G. B. Howden, General Manager of the Great Northern Railway (Ireland), to be General Manager also of C.I.E. brings a vigorous railway personality into the new organisation. Mr. Howden's experience and ability in many branches of railway work should prove of the greatest value to his board and colleagues. His progressive outlook, lively mind, and abounding enthusiasm have done a great deal towards keeping the G.N.R. (I.) in operation in the face of grave difficulties in recent years. In the wider field now open to him he will have greater scope. The handling of two offices will be no change for Mr. Howden, for as will be seen from the biographical details given elsewhere, he has held dual positions before. He has also taken a prominent part in the discussions concerning the future of the G.N.R.; this remains unresolved, but on all counts it is to be hoped that a final solution will not be delayed much longer.

Weight Transfer

BOTH acceleration and braking are produced at the expense of weight transfer from one axle to another. The examination of the degree is normally confined to acceleration and more particularly to locomotives. It is further simplified by ignoring the acceleration of the masses of the locomotive itself. The tractive effort is regarded as drawbar pull and calculations are made on this basis. It may be possible with locomotives to approximate, by neglecting the tractive effort required to accelerate the vehicle carrying the motive power; but with multiple-unit stock, where the motive power is distributed, this simplification can no longer be permitted. In some cases all cars become motor cars and theoretically drawbar pull and buffer thrust could be ignored. With braking also, if each car is caring for its own load, every car is theoretically an independent unit, reducing the speed of its own masses and neither accepting nor passing on work from or to neighbouring cars. With variation in passenger load and rates of rise in brake cylinder pressure, braking is interchanged; but basically the forces produced by the brake blocks deal with energies in the masses of the car concerned.

An article elsewhere in this issue explains, mainly in graphic form, the effect on weight transfer of the forces connected with acceleration and braking; formulæ are given which provide a basis for comparison of systems; and a table makes a comparison from which conclusions are drawn. One feature in the examination should dispel the still widely held idea that single outside brake blocks cause more weight transfer than double blocking or single inside blocks: the net primary weight transfer is in each case the same, but it can be seen from the diagrams that, with outside blocks, the couple through the hangers in the sprung part of the bogie is in the same sense as the secondary weight transfers. On the other hand, with inside blocks the hanger couple is in opposition. There is therefore more tilt on the bogie frame with single outside blocks, and the impression could be given that the weight transfer was greater. Energy is stored to a greater degree in the springs, and its release as the train comes to rest produces the unpleasant reaction described by Mr. R. A. Parke in his paper on "Railroad-Car Braking" in the *Journal* of the A.I.E.E., Vol. XX, p. 235. This should not be confused with true weight transfer. The feature not so apparent would be the effect of the couple on the unsprung part neutralising the apparent difference on the sprung part. With increasing intensity of service and demands for higher line capacity, higher accelerations and braking rates are called for to reduce headways. Both require the maximum use of adhesion, and the article may contribute to an appreciation of this problem.

Bar Frame Tolerances

A MINOR question raised by the increasing use of cast-steel locomotive bedplates in engines built in British works, *e.g.*, the 100 Class 24 engines for the South African Railways, is the tolerances and fits to be allowed on the frame. The well thought out limits and fits practice of the Locomotive Manufacturers' Association of Great Britain makes no mention of tolerances for frames—either plate or bar; and does not even detail the tolerances for the slots taking the horn guides, though fits between guide and box are noted.

There have been a number of other limits and fits schemes which have covered frame structures, notably the pre-war German DIN. Attempts were made to have such a system adopted by British builders a long time before the L.M.A., L.M.S.R., and other schemes were put into practice, principally as set down by E. Harle in "A Practical Application of British Standard Limits & Fits to Locomotive Construction," before the Institution of Engineering Inspection as long ago as 1930.

The above paper, though it provoked good discussion at the time, has never had the full attention it warranted. It was an endeavour to combine locomotive requirements with British Standard practice for engineering, and to make use of then existing overseas experience. As far as bar frames are concerned, it proposed tolerances of −0·00 in. and −0·0008 in. for the width of the guide slots; −0·008 in. between successive coupled guide faces, *i.e.*, corresponding to axle centres; −0·032 in. between the driving guide face and the transverse centre line of the cylinders; and −0·012 in. and −0·010 in. on the frame thickness; and −0·00 in. and −0·010 in. between the frames. These were drawn up really for slab frames, and the transverse tolerances are not applicable in the case of the cast-steel locomotive bedplates.

Rectifier Locomotives for the Pennsylvania

SEVERAL noteworthy converter locomotive designs have been produced in the United States with the object of using the good low-speed and starting characteristics of d.c. traction motors on lines electrified with low-frequency a.c. So far, rotary converting machinery has been used, but the suitability of modern rectifiers for use in railway vehicles has been demonstrated in recent months by the running of a motor coach equipped by the Westinghouse Electric Corporation with rectifiers of the ignitron type on the Pennsylvania Railroad. These trials, referred to in our April 7 issue, have been followed by the announcement that the Westinghouse firm is at the present time building two 6,000-h.p. rectifier type locomotives in association with the same railway.

Some details of the new locomotives were given recently in a paper read to the New York Railroad Club by Mr. A. C. Monteith, Vice-President in charge of Engineering, Westinghouse Electric Corporation. Each will consist of two Bo-Bo-Bo units with a combined weight of 295 tons and capable of developing a maximum tractive effort of 165,000 lb. Mr. Monteith stated that rotary converters for a locomotive of similar capacity would weigh four times as much as the rectifiers and their associated equipment. A comparison was made with an existing 5,625-h.p. a.c. locomotive of similar weight and dimensions to the new rectifier design, and it was shown that the latter would be able to develop continuously about 47 per cent. more tractive effort at low speed, without sacrifice of high-speed performance in that respect, which would be comparable with the acknowledged merits of a.c. machines in the higher speed ranges. Superiority in efficiency of conversion from electrical to mechanical power would lie with the rectifier design.

Mr. Monteith recalled the gruelling laboratory tests of ignitron rectifiers under severe vibration that had preceded the placing in service of the motor coach mentioned above. The answers to various problems would emerge only after further experience, but he drew attention to the possibilities of extended electrification being made economic by the ability to use a commercial frequency supply, standard

commercial rectifiers, and a type of traction motor that is produced in large numbers for use in the case of diesel-electric locomotives.

The new Westinghouse venture has been announced at a time when there is much interest in Europe in traction at the commercial frequency. In contrast to the rectifier approach to the problem, there appears to be fairly general confidence among European experts as to the practicability of designing efficient a.c. series traction motors for a 50-cycle input. Motors of this type are to be used in two of the locomotives for the forthcoming French experiments (see our June 17, 1949, and February 24, 1950, issues), while the third design will take its supply through a rotary converter.

Apparently it is not intended at the moment to carry on with the development of rectifier locomotives such as were introduced before the war on the Höllental section of the German State Railway. On the other hand, the Pennsylvania rectifier locomotives will follow a feature of one of the Höllental designs by using a tapped transformer for control purposes. The emphasis in Mr. Monteith's paper was on the simplicity of the rectifier system, and this consideration no doubt ruled out exploitation of the interesting possibilities of grid control as was embodied in another of the Höllental prototypes. Modern rectifier technique has eliminated some of the difficulties encountered in earlier experiments of this nature. Simultaneous development on opposite sides of the Atlantic of commercial frequency traction motors and railborne rectifiers should afford many useful opportunities for comparisons between the two systems.

Passenger Fares

(From a Correspondent)

THE calculation of present-day passenger fares by railway is a complicated matter, as it is necessary to refer as a basis to the fare in existence on September 30, 1937, and then to increase it by percentages at various stages. The September, 1937, third-class single fares were calculated (with some exceptions) at the rate of 1½d. a mile, *plus* odd halfpennies in the case of fares over one shilling.

On October 1, 1937, these fares were increased by the addition of 5 per cent. (code letter N) which was calculated, not to the nearest penny, but to the next higher multiple of a penny, except for fares up to 9½d., in which cases the increase was only ½d. This gave the pre-war fare, which "standard" has been used for further increases. The pre-war fare for ordinary and monthly return fares has been increased successively as follows:—

From May 1, 1940, by 10 per cent., Code Letter R
" December 1, 1940, by 16⅔ per cent., Code Letter C
" July 1, 1946, by 33⅓ per cent., Code Letter P
" October 1, 1947, by 55 per cent., Code Letter Z

In all these cases, however, the increase has been calculated to the nearest penny, and increases of ½d. for small amounts have not been made. Necessarily, these successive percentages have fallen most heavily on short journeys as the smallest unit of calculation is ½d. Thus, a journey of one mile is affected as follows:—

September, 1937, fare	1½d.
Add 5 per cent. (to next higher ½d.)	½d.
Pre-war fare	2d.
Add 55 per cent. (to nearest penny)	1d.
Present-day fare	3d.

Monthly return fares calculation is further complicated. Here again it is necessary to determine the September, 1937, single fare, and then to add 33⅓ per cent. The total of these sums is then rounded off to the next higher multiple of 3d., unless it is under 1s. 9d., when it is brought up only to the next higher multiple of a penny.

To find the present fare, this amount then has to be increased by 55 per cent. to the nearest penny. First-class single fares are 66⅔ per cent. higher than the equivalent third-class single fare, but here again the calculation must be made on the September, 1937, fare and then increased by 5 per cent. and 55 per cent. Similarly, the first-class monthly return fare is 50 per cent. over the third-class monthly return fare, but the old fare must be calculated, and to this amount must be added 5 per cent. and 55 per cent. The examples shown in the accompanying table will make this clear.

BRADFORD (EXCHANGE) AND STOCKPORT—38½ MILES

	s.	d.
THIRD-CLASS SINGLE:—		
September, 1937 fare, 38½ miles at 1½d.	4	10
Add 5 per cent. (to next higher penny)	0	3
Pre-war fare	5	1
Add 55 per cent. (to nearest penny)	2	10
Present-day fare	7	11
THIRD-CLASS MONTHLY RETURN:—		
September, 1937, single fare (as above)	4	10
Add 33⅓ per cent. to convert to monthly return	1	7
	6	5
Add (to round off to multiple of 3d.)	0	1
	6	6
Add 5 per cent. (to next higher penny)	0	4
Pre-war fare	6	10
Add 55 per cent. (to nearest penny)	3	9
Present-day fare	10	7
FIRST-CLASS SINGLE:—		
September, 1937, third-class single (as above)	4	10
Add 66⅔ per cent.	3	3
September, 1937, first-class single fare	8	1
Add 5 per cent. (to next higher penny)	0	5
Pre-war fare	8	6
Add 55 per cent. (to nearest penny)	4	8
Present-day fare	13	2
FIRST-CLASS MONTHLY RETURN:—		
September, 1937, third-class monthly return	6	6
Add 50 per cent.	3	3
September, 1937, first-class monthly return	9	9
Add 5 per cent. (to next higher penny)	0	6
Pre-war fare	10	3
Add 55 per cent. (to nearest penny)	5	8
Present-day fare	15	11

As fares must be written or printed on ordinary and monthly return tickets, a booking clerk may have in his office different tickets printed with fares calculated on various percentage increases, *e.g.*, 5 per cent., 10 per cent., 16⅔ per cent., 33⅓ per cent., and 55 per cent. To aid the booking office staffs, therefore, the fares on the tickets were marked by a code letter which denoted the fare at whatever stage it had been calculated, as shown in the above list of increases. N, indicated the new (October, 1937) fare; R, revised May, 1940; C, revised December, 1940; P, the first post-war (July, 1946) alteration; and Z, the last increase in the days of the former companies.

As stated in the first paragraph, there are certain exceptions to the mileage basis for fare calculation. If two places are served by alternative routes, the fare by either route is based on the distance of the shorter, *e.g.*, the distance from Bradford (Forster Square) to Leeds (City) is 13½ miles, but the fare is based on 10 miles, which is the distance from Bradford (Exchange) to Leeds (Central). Furthermore, the fares to Armley, Kirkstall, and Newlay & Horsforth from Bradford (Forster Square) are all the same, as they are limited by the fare on the Eastern Region route from Bradford (Exchange) to Armley & Wortley. Reductions also have been made to meet coastwise shipping competition. Exceptional increases are made where Acts of Parliament have authorised "special allowances" to compensate for the cost of major engineering works, which often would have resulted in a reduction in fares by reducing through mileages. Representative important additions to the actual mileage are: *e.g.*, Severn Tunnel (add 7 miles 51 chains); Barmouth Bridge (add 2 miles 29 chains); Runcorn Bridge (add 8 miles 66 chains); Talerddig cutting (add 5 miles 40 chains); Manchester (Victoria)-Miles Platting (add 1 mile 20 chains).

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Integration

June 10

SIR,—With reference to the article on "Integration" in your issue of June 9, may I refer to my suggestion in the discussion on Sir Cyril Hurcomb's paper on November 15, 1948.

"Integration" should be used for the technical combination of the different forms of transport so as to achieve the greatest operating efficiency and reduction of cost. "Co-ordination" should be used for the commercial and economic division of function between the alternative means of transport.

Mr. Pike's ingenious metaphor certainly helps to bring out the difference, especially in the present circumstances where the integration, which may go as far as fusion, takes place between undertakings under common ownership, independently of the competitive development of independent undertakings, while co-ordination applies to the relations between each form of transport whether forming part of a combined organisation or outside it.

Yours faithfully,

OSBORNE MANCE

Hill Top, Frith Hill, Godalming

Summer Timetables

May 30

SIR,—Your articles and the letters on the summer services have interested me greatly. On March 20 I placed an order at the local bookstall for a copy of the summer timetable of each Region of the British Railways and for three well-known bus and coach undertakings, the Aldershot & District, the Thames Valley, and the London Transport Green Line.

A first reminder produced the Southern Region tables about a fortnight after they were on sale at some stations, and a third reminder produced the Western Region table on May 25. I hope to get the other tables in time to travel north in July, but why the difficulty in obtaining tables which are already out and which were ordered in good time?

Yours faithfully,

E. E. D. HEDLEY
Lt.-Colonel

Fairfields, Longcross, Surrey

Commercial Train Services

May 15

SIR,—With reference to Mr. Bottomley's letter on Bradford's train services in your issue of May 12 I offer the following comment.

The Eastern Region has made some attempt to improve the Kings Cross services. The through coaches on the "Yorkshire Pullman," and the reinstatement of the "Harrogate Sunday Pullman" from June 5 are additional facilities. The London Midland Region suffers from the lethargy which seems to have gripped the old Midland Division. Bradford suffers along with Leeds and Sheffield in the slow London services, except that, by reason of its situation at the end of the route, journeys are more tedious. Only Leeds, however, shares the poor Birmingham and West of England services.

Local services from Bradford Forster Square were cut considerably during the war. The ill-fated October, 1946, timetable would have made much improvement, but because of poor reliability and lack of synchronisation in the provision of engines and guards at the right moment, and high fares the public response was poor. The effects of the fuel crisis resulted in a worse situation.

The gap between 12.12 p.m. and 2.40 p.m. in the Leeds City-Bradford service is worthy of comment. During the war and until 1947, the 1.20 p.m. stopping train bridged the gap. This train always had a reasonable patronage. I drew the attention of the District Passenger Manager, Leeds, to the situation when the train was withdrawn. It was explained that the coal shortage was responsible, but the service has never been reinstated.

The additional six miles of the rail journey from Bradford to Harrogate compared with the road distance, reflected in the fare structure, has been a limiting factor for many years. One cannot help feeling that the service should have been integrated in the London Midland Region rosters. For years the engine, coaches, and crew of one of the morning trains stayed outside Forster Square Station from about 10 a.m. until 1.10 p.m. Now that the North Eastern Region is responsible for the commercial side of the local services in question, perhaps some fresh thought can be given to them.

Yours faithfully,

A. E. YEADON

32, Vaudrey Drive, Timperley

Train Announcers

June 5

SIR,—It would be interesting to know why, at many stations in this country, train announcing is done by men who are totally unsuitable for this work. It is a source of great annoyance to passengers to hear a raucous and illiterate voice coming over the loudspeakers, which unfortunately magnify all the faults in diction.

In a short editorial about two years ago, *The Railway Gazette* called attention to the fact that there were some excellent lady announcers on British Railways, and it was a pleasure to hear them speak, but many of these young women have gone and their places are taken by men, who, though no doubt quite competent at their own jobs, are unsuitable for announcing.

It is difficult to see why adult men should be put on train announcing when it would seem to be a perfect occupation for a young girl who has just left school and who has had elocution lessons. It would be a needed measure of economy for British Railways and far more pleasant for the travelling public.

Yours faithfully,

AELLA

Extension of Cheap Travel Facilities

May 22

SIR,—In considering the continued decline in passenger traffic receipts, I feel that overmuch attention in fare concessions has been given to short-distance travel. For distances of under twenty miles in the provinces, the intermittent train service from a station, more often than not some distance from the village or town centre it serves, cannot in general hope to compete with road transport. Even where the rail service is reasonable and cheaper than the corresponding bus route such concessions are being poorly supported.

When considering distances of over twenty miles, rail transport is much stronger, and, given a wider introduction of cheap fares many railway routes would benefit considerably. Over 90 per cent. travel on Swiss railways is, I believe, at reduced rates, and traffic has been and is being lost on our railways because of the over-cautious re-introduction of such facilities.

Why not try to fill existing services before offering some of the special excursions? In midweek, and often at weekends, many regular trains, expresses included, are badly patronised.

Many day return tickets for journeys in excess of twenty miles are unnecessarily restricted to one train each way, neither of which may be convenient, the return, for instance, possibly being too late. As long as the return

journey is begun before midnight, why not, with certain necessary exceptions, allow choice of services? The same could apply to half-day tickets, which are generally not even available daily. These should be issued, again with necessary exceptions, for use on services after 9.30 a.m., and returning before midnight. Providing services are available, there need not be a limit on distance, but even if limited, for day returns to distances of under 100 miles, and 50 miles for half-day returns, many centres would be linked without the existing monthly return facilities being seriously abused.

Further, such additional traffic might well create a demand for additional services, particularly in the evenings, to the benefit of all railway travellers.

Yours faithfully,

B. SMITH

129, Rustlings Road, Sheffield, 11

French Railways Summer Services

May 29

SIR,—I was particularly interested in your leading article on the above subject in your issue of May 26, as I had the privilege of travelling to Menton on the "Blue Train" on Sunday, May 14, the first day that the new timetable operated. I was impressed by the fact that throughout the journey the timing was perfect, and that at every stop the train was on time. The public timetable shows the running time to Menton as 13 hr. 26 min., excluding time at stops for a journey of 690 miles, with arrival at 10.24, as compared with 12.18 the previous day. My return journey on May 24 was equally impressive, with arrival in Paris at 8.51.

The general recovery in French railway timings is amazing when one recalls the damage the system suffered during the war, and in this connection my own experience of journeys between Paris and Marseilles in the latter part of 1945 and the present timing of the recently-introduced "Le Mistral" make an interesting comparison. In 1945, the night *rapide* from Paris took 16 hr., but today one can do the journey in 10 hr. 3 min.

In conclusion, I was also interested to study at first hand the engineering works outside the Gare de Lyon, featured on pages 597-599 of your same issue; in fact, all the work carried out between Paris and Dijon since I last travelled over this stretch of track was most impressive.

Yours faithfully,

M. A. WEBB

7, Warwick Road, Bristol, 6

Scotland-West of England Services

May 20

SIR,—A year or two ago, a letter of mine was printed in *The Railway Gazette* drawing attention to the fact that there were then, some time after the termination of the war, no through trains and no through carriages, either by day or by night, by any service and by any of the alternative routes, between Scotland and the West of England.

That situation, incredible as it may seem, still holds today. The railways claim to be trying to attract back passenger traffic, yet the policy-makers on the Railway Executive are determined to continue to force everyone who wishes to travel between Scotland and the West of England and *vice versa*, to do so *via* London, with the inconvenience and expense of long taxi journeys with children and luggage thereby involved, between the termini.

Perhaps you and also your older readers will contrast this situation with that obtaining in the summer of 1914, when there were about half-a-dozen through services by day and the same number by night, running over different alternative routes, between the West of England and Scotland.

It is interesting to note how far this curious policy leads the compilers of the new London Midland Region summer service timetable. On (blue) page 33 it appears that seats can be reserved from Glasgow St. Enoch to Plymouth by the 5.30 p.m. train; but in the timetables concerned there is no mention at all of the train (or any through carriages) proceeding further south and west than Crewe! Why is there this shy reluctance to announce the glad tidings?

The 7.20 p.m. sleeping-car train from Euston to Inverness now has a complete monopoly of all passengers wishing to travel by night to the North of Scotland, whereas forty years ago in the days of private enterprise and healthy competition, one could travel to Inverness by excellent "Highland Expresses" from Kings Cross or St. Pancras, in addition to Euston. It stops at Crewe only on its non-stop run to Perth, presumably to pick up passengers, at 10.21 to 10.34 p.m. One would have thought that a convenient connection would have been arranged at Crewe for passengers from the West of England to join this train there, in the absence of any through carriages; but passengers from Bristol and beyond on weekdays have to wait at Crewe 1 hr. 52 min. On Sundays the "connecting train" from Bristol is made to miss the connection from Crewe to the North of Scotland by 19 min., being given no less than 68 min. for the 32½ miles from Shrewsbury to ensure that it shall comfortably miss the only night train to Inverness and the North of Scotland!

In my view, this it not the way to attract traffic, and especially long-distance traffic, back from road to rail.

When those of us who have motorcars can once again buy plenty of cheap petrol, our cars between the north and south-west of the British Isles will not be forced by prejudiced bureaucrats to travel *via* London, dozens of miles out of their direct routes—at least, I hope not.

Yours faithfully,

MICHAEL PETO

Dundonnell House, Wester Ross

British Railways Standard Locomotives

June 2

SIR,—In connection with the discussion proceeding in your correspondence columns centring around the British Railways' new standard footplate arrangement, I should like to add some comments.

Having, for some years, made a study of locomotive footplate features, I was amazed to find when details were published of the new cab, that apparently one feature in particular long outdated has been cheerfully applied again. This is the separate large-ejector steam valve, independent of the driver's application handle, an arrangement which does not compare with the combined feature of the Gresham & Craven "Dreadnought" and "SJ" ejectors as used by the L.N.E.R. and Southern Railway for many years.

When making an application of the train brakes it is most convenient for the large ejector to be worked from the same handle as the air disc valve, so enabling the driver to keep his hand on the one handle and not having to open and close a separate tedious wheel valve. With regard to the fire door, here again it is surprising that apparently the standard L.M.S.R. type sliding fire door is considered the best of all the many and varied designs used at home and abroad. I agree to a certain extent with your correspondent, Mr. R. Fareham, but am of the opinion that the circular G.C.R. pattern trapdoor is better for narrow fireboxes than the oval G.N.R. type as fitted on standard L.N.E.R. locomotives.

The pedal operated door, as fitted on the Bulleid Pacifics of the Southern Region, would overcome the objectionable heat mentioned by Mr. Fareham, and would possibly be the best type for use on the largest locomotives as, with the wide and shallow grates to be found on engines such as the Gresley Pacifics and "V2's," the heat thrown out from the firehole is a real discomfort to the crew.

Surely, with such a wide range of experience to draw on, the designers of the new standard locomotives can show a little more initiative, and make these machines really represent the best British practice.

Yours faithfully,

D. H. YARNELL

31, Milton Street, Lincoln

THE SCRAP HEAP

Signal Courtesy

"I hope you will find room to record a striking example of courtesy by a British Railways employee. The signalman of my small local station found out where I lived and cycled four miles, after duty on Saturday, to warn me that the train on which I travel to London regularly on Monday mornings was scheduled to leave 10 min. earlier, no preliminary notice of the alteration having been made."—*Mr. R. W. Clay, in a recent letter to "The Times."*

Early Railway Guide

The gift to the Rylands Library of a copy of the "First Bradshaw" brings to mind the curious dispute about the origin of the idea. A good many years after Bradshaw's first railway guide of 1839 a claim was made by a Manchester man, John Gadsby, to have been the true "originator of that valuable public benefit."

He said that he had had the idea before Bradshaw, but unfortunately had failed to copyright his own guide and then became so busy with the work of the Anti-Corn Law League as printer and publisher that he had had no time to develop the idea. Unfortunately for him, Gadsby's first "Railway List" has the imprint "No. 1, January, 1840," which made it three months later than Bradshaw.

Gadsby's List dealt only with railways affecting Manchester—the Liverpool and Manchester line, the Grand Junction, the Manchester and Bolton, the North Union, the Manchester and Leeds, the London and Birmingham, the Birmingham and Derby Junction. It was described as being issued "with the sanction of the Directors" and was priced at threepence.—*From "The Manchester Guardian."*

Noah's Ark Special

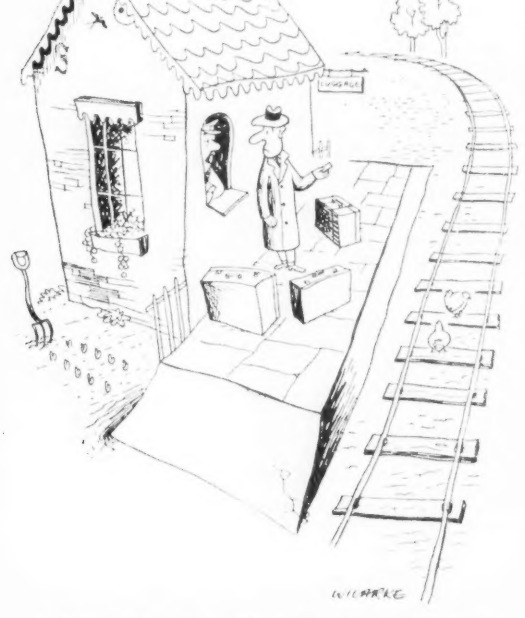
Moving Farmer McLean Walker, together with his family, 40 cattle, horses, poultry, furniture, farming implements, and motorcar from Lochwinnoch, Scotland, to Bude, Cornwall, on June 5 and 6 was a record long-distance farm removal for British Railways.

This special train travelled 550 miles and careful timing was necessary because the cattle consisted of tubercular tested stock. Special arrangements had to be made, therefore, for the train to stop at Birmingham and Okehampton to enable Mr. Walker and his staff to detrain and milk and feed the cows.

Farmer Walker and his farm left Lochwinnoch at 5.50 p.m. on June 5 and arrived at Bude in Cornwall at 6.25 p.m. the next day.

Rail-Air Co-ordination—1839

On Tuesday week Mr. Green, in company with Mr. Rush and Mr. Hughes, ascended in his large Nassau balloon, from Cheltenham, precisely at half-past three o'clock; and after a very pleasant, though circuitous ride of 85 miles through the air, passing close over the park of the Duke of Wellington at Strathfieldsaye, they made a safe landing at a quarter past seven, on Haizley Heath (*sic*), near Hartley Row, Hants—the aeronauts having been in "Clouds' Omnibus" three hours and a quarter. The gentleman in the management of the Winchfield and Hartley Row terminus of the London and Southampton Railway, on perceiving the aerial voyagers descending near to his station, sent persons to inform Mr. Green that he would have engine power to convey him, his companions, and balloon to London, which was accepted, and in one hour and ten minutes from the time of starting from Winchfield, a distance of 38½ miles, the balloon and its previous occupants were landed at Vauxhall.—*From "The Railway Times" of* 1839.



"First ticket I've sold since the train stopped halting here"

[*Reproduced by permission of the proprietors of "Punch"*

Railwaymen Mayors

Four members of the staff of the London Midland Region of British Railways have been elected mayors of boroughs for the coming year. They are: Signalman H. R. Gale, Mayor of Warrington; Clerk F. G. Exton, Mayor of Willesden; Driver W. Porter, Mayor of Chesterfield; Senior Clerk B. V. Hughes, Mayor of Conway.

Long Way Round

We give below an extract from a letter received from a firm by the Commercial Superintendent at York and passed to Euston House:

"We are advised by Mr. ..... that he travelled on the 5.55 p.m. train 'Manchurian' from Euston to Manchester London Road . . ."

Presumably, the above journey was made by way of Ostend, Brussels, Köln, Berlin, Warsaw, and Moscow!

On the Spot

Tony Bates, a ten-year-old train spotter, of Boreham Wood, Herts., has saved a train.

Early one evening Tony took up his usual spotting place at Elstree. He had just jotted down details of a passing train when he saw smoke belching from the axle of a wagon.

Racing along the platform on his cycle, he signalled to the guard in the rear truck and the train was stopped. The wagon was disconnected, and the fire put out by the station staff.

Tony rode away before the guard had a chance to thank him.—*From the "Sheffield Telegraph."*

The Allotted Span

The engine was ancient and grimy,
No colour enlivened its looks.
One could not imagine it featured
In railway advertisement books.

For long it had served its employers
On various parts of the line,
By hauling goods trains from the workshop
And wagons of coal from the mine.

It never had cared for the wagons
That rattled and clattered behind;
Its buffers were sore from the bangings
That made up its hard daily grind.

It had no great claim to distinction,
'Twas not in a class by itself;
No museum walls would enclose it,
Now that it was due for the shelf.

A nothing-six-nothing goods engine,
Now reaching its allotted span;
It had helped the trade of the country,
Enriching the welfare of man.

The scrapyard, alas, will now claim it,
Where hammers will sound its death-knell.
And what will it get from the nation?
A whopping great soldier's farewell.

R. M.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Annual Budget Review

The Southern Rhodesia Minister of Finance (Hon. E. C. F. Whitehead), in his budget speech reviewing the past year as a whole, said that the railways had had a successful year, the tonnage handled having increased by 15 per cent. Much new equipment has been put into service. Estimated expenditure on capital account in the year reviewed amounted to £5,000,000, including £3,483,900 for locomotives and rolling stock, £935,300 for European housing, and £109,900 African housing. The estimated financial results for the year show a tentative surplus of £430,000. Rates remained level throughout the year, though in common with all other industries in Rhodesia the railways faced a period of rising costs. Progress in increasing overall efficiency and mechanisation is reported.

Steel-Asbestos Houses

A total of 103 steel-asbestos prefabricated houses will be erected at various point on the railway system.

SOUTH AFRICA

Rates Committee Report

The report of the committee appointed in November, 1947, to inquire into railway rating policy in South Africa has now been published as a Blue Book. The chairman of the committee was Sir Charles Newton, and the members Mr. H. G. Ashworth and Dr. F. J. van Biljon.

In its covering letter to Mr. P. O. Sauer, the Minister of Transport, the committee says that some of its recommendations will require further detailed analysis before they can be put into effect, partly because in the ascertainment of costs there is much that could and should be disclosed but cannot be made available without special arrangements for the collection of data. Such detailed cost studies would have to become a permanent feature of the rate-fixing machinery.

The committee considers that a flexible method of rating remains essential to take account of the capacity of the traffic to bear the railway charge, but this should not mean that the higher rates are fixed at the maximum amount which the higher rated commodities can bear. It should be the aim rather that the rates of lower-classified commodities are as high as they can truly bear.

The report adds that it appears that the Railway Administration has to some extent encouraged traffic in a manner which departs from the proper economic principles of rating, that studies clearly indicate that rates chargeable on much low-class traffic do not cover direct costs, and that some high-rated traffic hauled by rail short distances is carried at rates which do not cover terminal costs such as loading and unloading.

The report recommends the setting up of a permanent rates commission like those of other countries. Only in this way can rating control be applied in the general public interest. To ensure that rating is based on business principles, every rate must more than cover the direct costs, not merely of carrying an extra parcel of that particular traffic, but of carrying the general run of that traffic in loads of normal bulk, and subject to this, no rate must exceed what the traffic can reasonably bear.

Dealing with the railways under the provisions of the South Africa Act, 1909, the report says that the practical interpretation of Section 127 is that the railways must be run efficiently to provide cheap transport, and charges must fall fairly on individuals and equitably in the general interests of the country. It is not therefore permissible for the Administration to charge for a service a price under the direct cost of providing it, as the resulting losses must be recouped from other railway users.

Dr. F. J. van Biljon makes certain reservations in an addendum to the report, but states that he mainly agrees with its findings.

CANADA

Ontario Northland Dieselisation

The Ontario Premier has announced a $1,930,000 modernisation programme for the Ontario Northland Railway. He said that contracts have been let for four diesel 1,500-h.p. units at a total cost of $2,000,000, and a 1,000-h.p. diesel engine at a cost of $130,000. In addition, $800,000 will be spent in construction and equipment for a diesel repair shop at North Bay. The diesel programme will take six years and the engines will be built by General Motors of Canada plant in London, Ontario, and the Montreal Locomotive plant, Montreal.

SWITZERLAND

Berne Station Remodelling

The prolonged attempt to finalise plans for the remodelling of Berne Central Station and its immediate surroundings has been brought nearer to a conclusion by the recent publication of the results of a further contest. Earlier, more far-reaching plans to move the entire station to a more spacious site some distance away had been discarded, and the general track layout of the existing station had to be accepted. The programme also called for due regard to architecturally valuable buildings in the vicinity. The main purpose of the latest contest was to obtain ideas which could be embodied in the final plans.

The assessing committee does not recommend immediate measures to place some of the road traffic underground, but this possibility should not be prejudiced. It is, however, recommended to create adequate parking space above or below ground. The idea of combining the station building with a major office building is favoured, and the construction of commercially useful buildings above the tracks is not ruled out.

DENMARK

Fares and Rates Increases

Because of the increasing deficit of the State Railways, increases in fares and rates were authorised as from June 1. It has been estimated that they should bring in a further Kr. 30,000,000 a year.

The present single fare is not altered, but return tickets are now 1·8 instead of 1·5 times a single ticket. The prices for 8 and 15 days tickets are increased approximately 10 per cent. The goods rates are generally increased by 10 per cent., although the increase varies to some extent according to class and distance. Post office traffic is already charged a higher rate. The higher rates for goods and post should bring in Kr. 9,000,000 more.

Summer Timetables

The summer timetables show further improvements on previous tables, so that the passenger train-mileage reaches 93 per cent. of that of 1939. The three international trains, "Nord Express," "Scandinavia-Holland-Express," and "Scandinavia - Switzerland - Italy - Express" will run to about the same schedules as before, but to cater for the expected heavy traffic duplicate trains are planned to run daily between Copenhagen and Paris, Amsterdam, and Rome. The route to Great Britain *via* Esbjerg-Harwich will have a service four times a week.

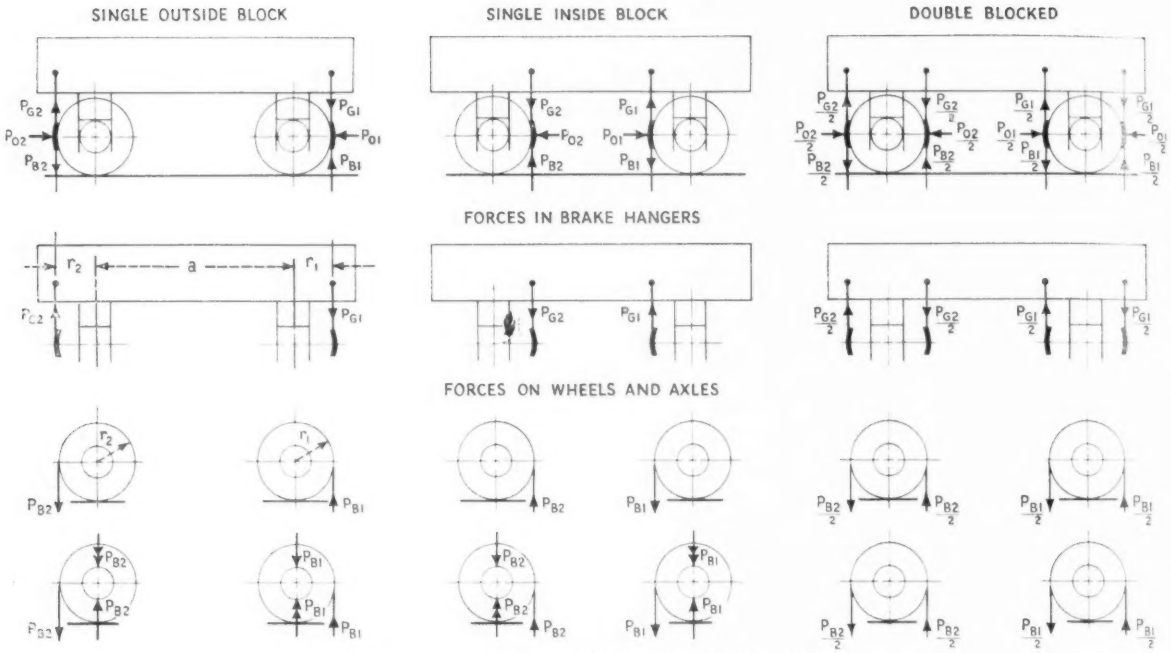
Between Copenhagen and Kalundborg there will be a new express service in connection with the State Railways Kalundborg-Aarhus steamer service, by which it will be possible to reach the northern part of Jutland more quickly than *via* Fredericia. Another important improvement is in the electrified Copenhagen suburban service, where speeds are increased considerably and the service has been reorganised and augmented. There are now four lines, named A, B, C, and F, each with a twenty min. service. As three of the lines use the same tracks between Hellerup and Copenhagen Central, this section will now have three trains in 20 min. From Copenhagen to Vanlose there are two trains every 20 min. In peak hours the lines have a 10-min. service.

PRIMARY WEIGHT TRANSFERS

BRAKING

DIRECTION OF MOTION ⟶

ORIGINATING FORCES IN BOGIE



$W_{TB}\,a = P_{G1}\,(a + r_1) + P_{G2}\,r_2 - P_{B1}\,a$

$P_{G1} = P_{B1}$

$P_{G2} = P_{B2}$

$W_{TB} = \dfrac{P_{B1}\,r_1 + P_{B2}\,r_2}{a}$

$W'_{TB}\,a = P_{B1}\,a + P_{G2}\,r_2 - P_{G1}\,(a - r_1)$

$P_{G1} = P_{B1}$

$P_{G2} = P_{B2}$

$W'_{TB} = \dfrac{P_{B1}\,r_1 + P_{B2}\,r_2}{a}$

$W''_{TB}\,a = \dfrac{P_{G1}}{2}(a + r_1) + \dfrac{P_{G2}}{2}\,r_2 + \dfrac{P_{G2}}{2}\,r_2 - \dfrac{P_{G1}}{2}(a - r_1)$

$P_{G1} = P_{B1}$

$P_{G2} = P_{B2}$

$W''_{TB} = \dfrac{P_{B1}\,r_1 + P_{B2}\,r_2}{a}$

NOTE – THE WEIGHT TRANSFER IS IN EACH CASE THE SAME

Weight Transfer in Multiple-Unit Electric Stock

An appreciation of the problem of the maximum use of adhesion with higher acceleration and braking rates

By H. R. Broadbent, B.Eng.

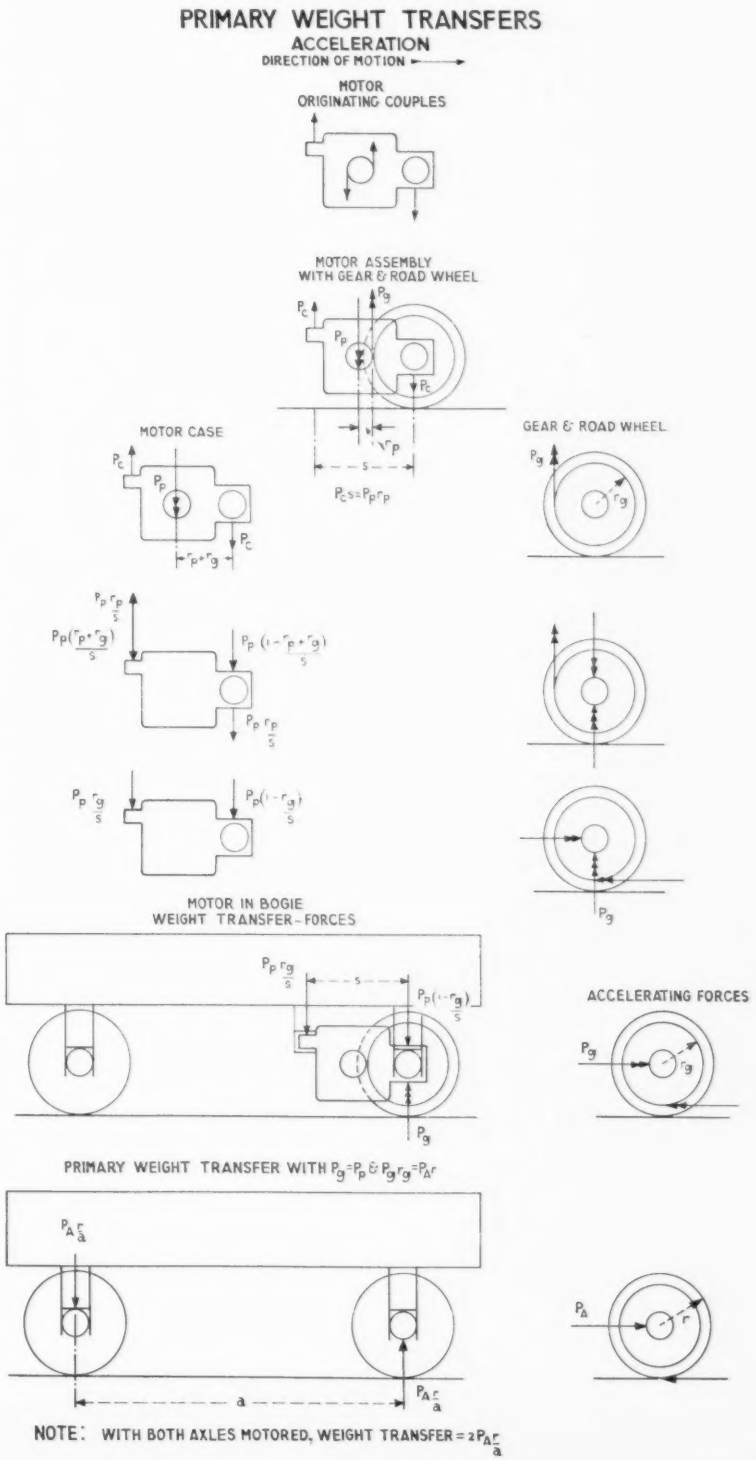
THIS examination of weight transfer is limited to multiple-unit electric stock, but covers the effect of both acceleration and braking, both of which factors are of importance with traffic of high density, though braking has the greater influence.

The weight transfers which occur in acceleration and braking have been divided into two categories, primary and secondary. The primary weight transfers result directly from the originating motor torques or applied brake shoe forces, and are at one end, as it were, of the sequence of forces which produce an acceleration or braking of the various masses which constitute the car or train. The secondary weight transfers result from the fact that the majority of the masses to be accelerated or retarded and any forces transferred to or from adjoining cars are not at axle level. As the accelerating and braking forces are transmitted at axle level to the components, couples result which can only be balanced by weight transfer.

Allowance has been made for the acceleration, or braking, of the rotating parts, as the consequent reduction in force available for train movement has an appreciable effect on the weight transfers. For simplicity the analysis has been confined to an unloaded train, operating on a level tangent track and fitted with motor wheels of equal diameter and unmotored wheels of equal diameter. It is also assumed that the normal practice in multiple-unit stock bogie design has been followed, with no equalisation in springing. Train resistance has been ignored, as it is negligible during the period of high acceleration, when speeds are low, and in braking generally tends to reduce weight transfer.

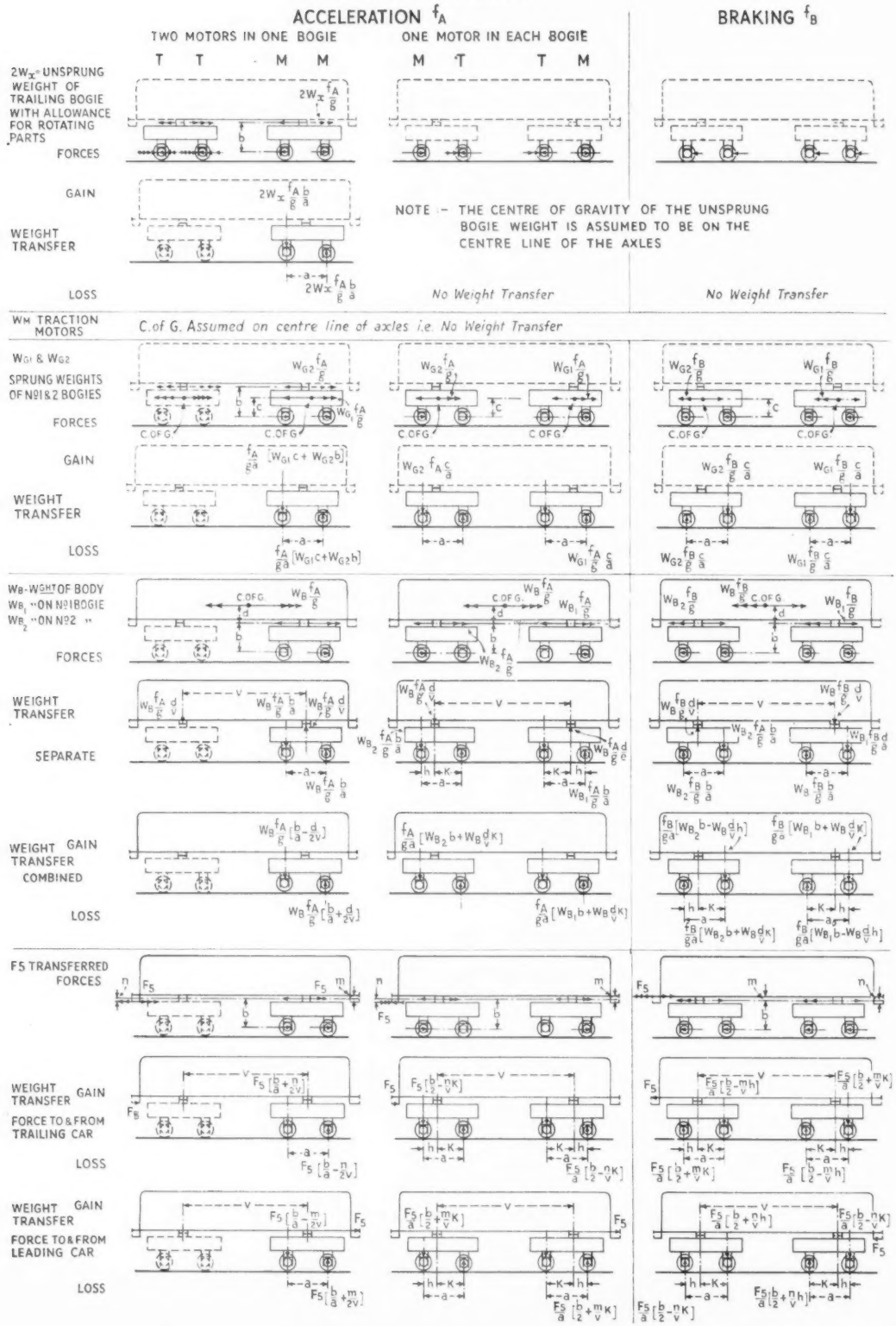
The diagrams which follow trace the forces originating in motor torque and applied brake shoe, firstly to the resulting primary weight transfers and accelerating or braking forces available at wheel and axle. The accelerating or braking forces available for train movement are further followed to the centres of gravity of the masses on which they act, and the resultant secondary weight transfers are valued.

The notation indicating the passage of a force from one body assumed to be rigid to another, makes use of a single arrowhead for the accelerating or braking force, acting from axle to bogie frame. The transposed force, acting either on a second or subsequent body or on a mass at its centre of gravity, is given an additional arrowhead, the reaction continuing to carry the preceding number of heads. It is the reaction forces which with their parents form the couples causing secondary weight transfer. The total weight transfers in each case are grouped in a series of three equations which are used to compare different systems. The com-



SECONDARY WEIGHT TRANSFERS

DIRECTION OF MOTION ⟶



parisons are shown in a table and conclusions are drawn from the results.

The following basic equations and consideration of the effect of weight transfer, as explained above, have led to the production of three equations, both for acceleration and braking, from which a comparison between different systems may be made.

Acceleration

Basic Equations

$$x_m P_A = \psi (W_m - W_T)$$

$$N x_{mt} P_A = \frac{W f_A}{g}$$

where P_A = total accelerating force per motored axle for train movement and rotating parts.
x_m = factor reducing the accelerating force by the amount required for accelerating the rotating parts of the traction motor, gears, and motored axle and wheels.
x_t = above factor for unmotored wheels.
x_{mt} = above factor for the combination of x_m and x_t.
ψ = effective coefficient of adhesion, *i.e.*, effective coefficient of friction between wheel and rail.
W_m = weight on rail of limiting motored axle.
W_T = weight transfer, from or to an individual axle.
W = weight of train.
N = number of traction motors on the train.
g = acceleration due to gravity.
f_A = acceleration of the train.

Comparative Equations

1. Maximum acceleration $f_A = \dfrac{g\psi \dfrac{NW_m}{W}\dfrac{x_{mt}}{x_m}}{1 + \psi Z_A}$

2. In terms of ψ, ratio $\dfrac{W_T}{W_m} = \dfrac{\text{weight transfer}}{\text{unaccelerated weight on rail}} = \dfrac{\psi Z_A}{1 + \psi Z_A}$

3. Ratio $\dfrac{W_T}{W_m}$ in terms of f_A

$$= \frac{f_A}{g} \frac{W}{NW_m} \frac{x_m}{x_{mt}} Z_A$$

Z_A varies with the position and number of traction motors. The variations under different conditions are shown in the table below. It is assumed that the accelerating relays in the train are all set to the same value, and the limiting axle will therefore control the acceleration. As the tractive effort during acceleration will be the same from each motor, assuming equal wheel diameter, the weight transfer couples $W_{B1} \frac{f_A}{g} b$ and $W_{B2} \frac{f_A}{g} b$ shown on the diagrams will become equal and of a value $\frac{W_B}{2} \frac{f_A}{g} b$, on the assumption that the two motor trucks are of the same weight.

In arriving at Z_A a further factor, x_p, has been introduced to cover the loss in transmission through the gears. The diagram of primary weight transfer ends with a condition of $P_g = P_p$ and $P_g r_g = P_A r$, or, in other words, a proviso of no loss in transmission. If, however, allowance be made for loss, the couple $P_A r$ will be reduced relative to $P_g r_g$. The factor x_p covering this reduction appears in the primary weight transfer form of Z_A below. P_A retains the meaning of the force available for train movement and acceleration of rotating parts, but the value of primary weight transfer rises to $\frac{P_A}{x_p} \frac{r}{a}$, where x_p will be of the order of 0·98. P_A represents the tractive effort at the wheel tread which would be arrived at by calculation from motor input minus all motor losses, inc uding transmission loss. See Table I below.

The transferred forces F_5 will be influenced to some degree by the assumption of equal accelerating motor tractive efforts, since the heavier motored cars must receive some of their accelerating force from the lighter motor cars. The influence of this factor on the percentage weight transfer will in practice be very small.

Braking

In braking, the basic equations must be approached in a somewhat different manner from that employed in deriving the acceleration equations. If the static adhesive train weight could be used completely, then F_B, the total force braking the train, other than the rotating parts, would $= \psi W$, where ψ = coefficient of adhesion and W = train weight.

There are, however, two conditions,

TABLE I

Axles motored	Limiting axle	Adjoining car	Variations in Z_A
Nos.	No.		
1 and 4	1	hauled ..	$\frac{1}{aW}\left[\frac{rW}{x_m x_p} + \frac{x_{mt}}{x_m} N \left\{ W_{G1} c + \left(\frac{W_B}{2} + \frac{W_t}{2x_t}\right) b + W_B \frac{dk}{V} - \frac{W_t\, nk}{x_t\, V} \right\}\right]$
1 and 4	1	propelled	$\frac{1}{aW}\left[\frac{rW}{x_m x_p} + \frac{x_{mt}}{x_m} N \left\{ W_{G1} c + \left(\frac{W_B}{2} + \frac{W_t}{2x_t}\right) b + W_B \frac{dk}{V} + \frac{W_t\, mk}{x_t\, V} \right\}\right]$
2 and 3	3	hauled ..	$\frac{1}{aW}\left[\frac{rW}{x_m x_p} + \frac{x_{mt}}{x_m} N \left\{ W_{G2} c + \left(\frac{W_B}{2} + \frac{W_t}{2x_t}\right) b - W_B \frac{dh}{V} + \frac{W_t\, nh}{x_t\, V} \right\}\right]$
2 and 3	3	propelled	$\frac{1}{aW}\left[\frac{rW}{x_m x_p} + \frac{x_{mt}}{x_m} N \left\{ W_{G2} c + \left(\frac{W_B}{2} + \frac{W_t}{2x_t}\right) b - W_B \frac{dh}{V} - \frac{W_t\, mh}{x_t\, V} \right\}\right]$
1 and 2	1	hauled	$\frac{1}{aW}\left[\frac{2rW}{x_m x_p} + \frac{x_{mt}}{x_m} N \left\{ W_{G1} c + \left(2W_x + W_{G2} + W_B + \frac{W_t}{x_t}\right) b + \frac{W_B\, da}{2\ V} - \frac{W_t\, na}{2x_t\, V} \right\}\right]$
1 and 2	1	propelled	$\frac{1}{aW}\left[\frac{2rW}{x_m x_p} + \frac{x_{mt}}{x_m} N \left\{ W_{G1} c + \left(2W_x + W_{G2} + W_B + \frac{W_t}{x_t}\right) b + \frac{W_B\, da}{2\ V} + \frac{W_t\, ma}{2x_t\, V} \right\}\right]$
3 and 4	3	hauled	$\frac{1}{aW}\left[\frac{2rW}{x_m x_p} + \frac{x_{mt}}{x_m} N \left\{ W_{G2} c + \left(2W_x + W_{G1} + W_B + \frac{W_t}{x_t}\right) b - \frac{W_B\, da}{2\ V} + \frac{W_t\, na}{2x_t\, V} \right\}\right]$
3 and 4	3	propelled	$\frac{1}{aW}\left[\frac{2rW}{x_m x_p} + \frac{x_{mt}}{x_m} N \left\{ W_{G2} c + \left(2W_x + W_{G1} + W_B + \frac{W_t}{x_t}\right) b - \frac{W_B\, da}{2\ V} - \frac{W_t\, ma}{2x_t\, V} \right\}\right]$

Where the dimensions a, b, c, d, h, k, V, m, n and r are those used in the diagrams and
W_{G1} = sprung weight of No. 1 bogie.
W_{G2} = sprung weight of No. 2 bogie.
W_B = weight of the body with all its equipment.
W_{B1} = that portion of the weight of the body which rests on No. 1 bogie.
W_{B2} = that portion of the weight of the body which rests on No. 2 bogie.
$2W_x$ = unsprung weight of unmotored bogie + $(1 - x_t)$ (weight on unmotored wheels.)
(Note: the latter part of W_x allows for the rotating parts)
W_t = the weight of the hauled or propelled load.
(Note: the total weight may be shared with other motored cars and W_t will therefore only be that part which can be assigned to the car under examination.)
x = factor accounting for transmission loss through the gears.

weight transfer and brake equipment design, which modify this equation. The first reduces the static weight on alternate axles down the train depending on the direction of running, and the second limits for practical reasons the discrimination between individual axle weights. There will, therefore, be one axle or group of axles in a train which, if wheel skid is to be avoided, will limit the air pressure to which all brake cylinders will be charged. The total braking force will therefore be reduced from ψ W to

$$F_B = \psi W \times \left(\frac{W_L - W_T}{W_L}\right)$$

where W_L is the unloaded static weight on the limiting axle in the train and W_T is the weight transferred from that axle.

The braking forces provided by individual axles in the train will be expressed by equations of the form

$$x_1 P_{B1} = \psi W_1 \left(\frac{W_L - W_T}{W_L}\right)$$

$$x_2 P_{B2} = \psi W_2 \left(\frac{W_L - W_T}{W_L}\right) \text{ etc.}$$

where

P_{B1} = total force on No. 1 axle and wheels, both for train deceleration and braking the rotating parts.

P_{B2}, P_{B3} and P_{B4} = corresponding forces on Nos. 2, 3 and 4 axles.

x_1, x_2, x_3 and x_4 are the factors by which P_{B1}, P_{B2}, P_{B3} and P_{B4} are multiplied to allow for braking the rotating parts.

W_1, W_2, W_3 and W_4 are static weights on rail of Nos. 1, 2, 3 and 4 axles.

(Note : It is assumed that the braking force on each axle is responsible for the rotating parts corresponding to that axle.)

In examining a given direction of running it may be possible by inspection to decide which is the limiting axle, but failing this, each must be worked out to find the worst condition. The two conditions of No. 2 and No. 4 being the limiting axles, for the direction of motion given on the diagrams, are shown below :—

Basic Equations

$$F_B = \psi W. \left(\frac{W_2 - W_T}{W_2}\right) \text{ or } \psi W \left(\frac{W_4 - W_T}{W_4}\right)$$

with No. 2 axle limiting

$$x_1 P_{B1} = \psi W_1 \left(\frac{W_2 - W_T}{W_2}\right)$$

$$x_2 P_{B2} = \psi W_2 \left(\frac{W_2 - W_T}{W_2}\right) = \psi (W_2 - W_T)$$

with No. 4 axle limiting

$$x_3 P_{B3} = \psi W_3 \left(\frac{W_4 - W_T}{W_4}\right)$$

$$x_4 P_{B4} = \psi W_4 \left(\frac{W_4 - W_T}{W_4}\right) = \psi (W_4 - W_T)$$

$$F_B = \frac{W f_B}{g}$$

or with No. 2 axle limiting

$$\psi \left(\frac{W_2 - W_T}{W_2}\right) = \frac{f_B}{g}$$

where f_B = rate of braking of the train.

From the above equations and consideration of the weight transfers are derived the comparative equations given below :—

Comparative Equations

1. Maximum braking $f_B = \dfrac{g\psi}{1 + \psi Z_B}$
2. In terms of ψ, ratio $\dfrac{W_T}{W \text{ axle}}$ = weight transfer, static weight on rail $= \dfrac{\psi Z_B}{1 + \psi Z_B}$
3. Ratio $\dfrac{W_T}{W \text{ axle}}$ in terms of f_B $= \dfrac{f_B}{g} Z_B$

where Z_B varies for different conditions as shown in Table II.

W_t is taken to be the transferred forces from underbraked or overbraked adjoining cars $\left(F_5 = \dfrac{W_t}{g} f_B\right)$

In order to appreciate the loss in weight on an axle which may take place in acceleration and braking, the case has been taken of a single surface-line motor car with two traction motors, mounted on : (1) The inner axles of each bogie ; (2) the outer axles of each bogie ; and (3) both axles of one bogie. This is equivalent to an all-motor-car train with 50 per cent. of the axles motored, the only difference being the absence of transferred forces from or to other cars. In particular cases it would be necessary to allow for this. The effect of moving the body bearing from its more usual place above the level of the axle down to axle level is demonstrated, as is also the

TABLE II

Limiting axle	Underbraking from cars	Z_B
No.		
4	leading	$\frac{1}{aW_4}\left[\frac{W_3 r_3}{x_3} + \frac{W_4 r_4}{x_4} + W_{G2}c + \left(W_{B2} + \frac{W_t}{2}\right)b - W_B\frac{dk}{V} - W_t\frac{mk}{V}\right]$
4	trailing	$\frac{1}{aW_4}\left[\frac{W_3 r_3}{x_3} + \frac{W_4 r_4}{x_4} + W_{G2}c + \left(W_{B2} + \frac{W_t}{2}\right)b + W_B\frac{dk}{V} + W_t\frac{mk}{V}\right]$
2	leading	$\frac{1}{aW_2}\left[\frac{W_1 r_1}{x_1} + \frac{W_2 r_2}{x_2} + W_{G1}c + \left(W_{B1} + \frac{W_t}{2}\right)b - W_B\frac{dh}{V} - W_t\frac{nh}{V}\right]$
2	trailing	$\frac{1}{aW_2}\left[\frac{W_1 r_1}{x_1} + \frac{W_2 r_2}{x_2} + W_{G1}c + \left(W_{B1} + \frac{W_t}{2}\right)b - W_B\frac{dh}{V} - W_t\frac{mh}{V}\right]$

where the dimension and weight symbols, if not mentioned above, are those already assigned to them in acceleration.

TABLE III

Case examined of all cars, motored cars (with two traction motors per car), unloaded surface-line car

Greatest loss in weight per cent. on an axle with $\psi = 0{\cdot}16$

Axles numbered ←——— 4—3—2—1 ———→

	Motor car with two traction motors						Trailer	
	One motor per bogie on			Two motors per bogie on			With king pin	
	Inner axles	Outer axles		Motored bogie	Unmotored bogie king pin		central	offset
		A	B		central	offset		
Acceleration								
Direction of running	→	←	←	→				
Limiting axle no. ..	3	4	4	1				
Percentage loss in weight	4·0	5·7	4·6	10·6				
Braking								
Direction of running	←	→	→	←	→	→/←	→/←	→/←
Limiting axle no. ..	1	2	4	1	4	4 and 3	4 and 1	2 and 4, 3 and 1
Percentage loss in weight	13·2	10·5	7·7	10·6	12·1	11·0	11·6	10·6

A : with weight of body bearing normal
B : with weight of body bearing brought down to axle level.

change from a central body bearing or king pin to an offset. The king pin is offset to give greater adhesive weight on the driving axle in both cases of one motor per bogie. This is seen in Table III on page 682.

It will be seen that with acceleration, the order of merit in percentage weight transfers or per cent. loss in weight is as follows :—

	Loss in weight, per cent.
Best—one motor/bogie on inner axles	4·0
Intermediate—one motor/bogie on outer axles	5·7
Worst—two motors/bogie	10·6

For braking, the comparison, with the usual arrangements of drive for the body, is as follows: —

	Loss in weight, per cent.
Best—one motor/bogie on outer axles	10·5
Intermediate—two motors/bogie ..	12·1
Worst—one motor/bogie on inner axles	13·2

The effect of bringing the bearing for the body down to axle level is shown by the comparison between braking in the 2nd and 3rd column of the table under braking. The two axles which lose weight in braking are Nos. 2 and 4 for the direction shown, and 3 and 1 for the opposite direction. The losses per cent. for these axles for the two directions, in the case considered, are given in full below.

One motor per bogie on outer axles
Loss in weight, per cent.

Direction of running →			←	
Axle No. with body bearing	2	4	3	1
(*a*) normal ..	10·5	9·4	10·3	9·3
(*b*) at axle level	6·2	7·7	6·0	7·6

In both (*a*) and (*b*) there is a difference between the percentages on the affected axles which could be reduced, producing an improvement, by a somewhat different offset. It is, however, clear that the movement of the body bearing to axle level can effect a considerable reduction in weight transfer.

It will be seen also that an improvement from 12·1 per cent. to 11·0 per cent. can be obtained on the unmotored bogie of the two motors bogie car by offsetting the king pin. A similar improvement, from 11·6 per cent. to 10·6 per cent., can be obtained by offsetting on a trailer car, and it would be a refinement in design of all unmotored bogies to offset the king pin to give a greater weight on the outer axle, of an amount which can be determined with fair accuracy.

In most cases of intense service an increase in braking rates has more effect on line capacity than an increase in acceleration. If a choice must be made, therefore, it seems that the fitting of one motor on the outer axle of each bogie of the motored car is the best arrangement.

New Co-Co Locomotives for the Gotthard Line

A six-axle design to obviate piloting of heavy trains and cope with increased traffic expected

THE Swiss Federal Railways have placed an order for two powerful electric locomotives of the Co-Co type with the Swiss Locomotive & Machine Works, Winterthur, and the Brown, Boveri Company, Baden. The locomotives are for use on the Gotthard Line.

The main characteristics of the locomotives, which will embody many interesting details, are the following:—

Wheel arrangement ...	Co-Co
Wheels, dia.	4 ft. 1⅝ in. (1,260 mm.)
One hour rating ...	6 × 1,000 h.p. at 46 m.p.h.
Continuous rating ...	6 × 900 h.p. at 49 m.p.h.
Maximum speed ...	78 m.p.h.
Weight in working order	120 tonnes
Maximum axle load ...	20 tonnes

Excessive Double-Heading

During the winter of 1948-49 some 50 per cent. of all express trains on the Gotthard Line had to be double-headed, and in July, 1949, the figure rose to 70 per cent. The use of so many assisting locomotives is uneconomic in motive power and personnel. Time is lost through the additional shunting movements, and valuable paths are occupied by the engines returning light. The heavy demands on motive power has necessitated the use of out-of-date locomotives which are no longer suitable for express working. The acquisition of new locomotives suitable for the haulage of the Gotthard Line expresses has therefore become necessary for both operating and economic reasons.

Recent progress in electric traction makes it possible to use the entire weight as adhesion weight even with express locomotives. An 80-*tonne* locomotive is able to haul 400 *tonnes* up the 1 in 39 gradients of the Gotthard line, and a 120-*tonne* locomotive will haul 600 *tonnes*.

Choice of Type

The choice between a four-axle 80-*tonne* locomotive and a six-axle 120-*tonne* locomotive was carefully considered by the Federal Railways, and the heavier type found more suitable from an operating and economic viewpoint. If such locomotives had been available during the winter of 1948-49, the percentage of double-heading would have gone down from 50 per cent. to 3·6 per cent., and in July, 1949, 12·2 per cent. The number of locomotive *tonne*-km. would have been reduced from 256,000,000 to 230,000,000. The heavier locomotives also deserve preference in view of the probable future development of the Gotthard line traffic.

In co-operation with the Swiss industry, the Federal Railways began to develop the design for a new six-axle express locomotive over a year ago. The six motors will develop 6,000 h.p. at the one-hour rating, so that the locomotive will be capable of hauling a 600-*tonne* train up a 1 in 37 gradient at a speed of 47 m.p.h. The maximum speed will be 125 km. hr. The locomotives will be fitted with Brown Boveri high tension control and spring drive.

The locomotive may be compared with the Ae 4/4 locomotive of the Lötschberg line, which weighs 80 *tonnes* and develops 4,000 h.p. at a speed of 75 km.p.hr. The cost of the new locomotive will be fr.162,000,000, including fr.600,000 for the mechanical equipment and fr.900.000 for the electrical equipment. The first order is confined to two locomotives, so that the novel features of the new design may first be tested.

FRENCH UNDERGROUND RAILWAY PROJECTS. —Calcutta, Montevideo, Rio de Janeiro, Genoa, Istanbul, Cairo, Karachi, Bombay, Sao Paulo, Quebec, Caracas, and Mexico City are cities for which underground railway schemes have been or are about to be evolved by Société Générale de Traction et d'Exploitations, the former Compagnie du Chemin de Fer Métropolitain de Paris. A preliminary scheme was drawn up by October last for an underground railway at Calcutta, with a route-mileage of 12½ miles. An equipment project has also been drawn up, and the firm is now awaiting the decision of the West Bengal authorities. For the underground railway planned for Montevideo a final project has been evolved for the first line, 5½ route-miles long, with preliminary schemes for the second and third lines. Building contracts for the first line may be awarded in July. The company, whose activities were mentioned in our issue of July 15, 1949, recorded a net profit of fr. 85,513,575 in 1949, and is to pay a gross dividend of fr. 54·50 (fr. 44 net) per capital share, and fr. 50 gross (fr. 41 net) per bonus share. It has been decided to increase the share capital of the company by fr. 51,499,500, to fr. 257,497,500 by increasing the face value of their shares from fr. 1,000 to fr. 1,250.

Resilient Gearwheels for Traction Drives

A design affording a high degree of torsional resilience by the use of three-unit members

FUTURE development in electric locomotive design seems certain to be based on the power bogie type of machine. Ratings as high as 4,000 h.p. are found among Continental locomotives in this category, the larger and faster classes having various forms of flexible drive from motors suspended independently of the axles. British practice, both for service at home and abroad, continues to favour the axle-hung motor. Improved methods have been developed for cushioning the shocks likely to be transmitted in both directions between motors and track, and it is considered that these will enable the advantages of the straightforward gear and pinion drive to be retained in locomotives of increasing power and speed.

An important factor in this respect is the resilient gearwheel, in which a measure of torsional resilience is provided between rim and hub to relieve impact forces. In some types of wheel this is achieved by means of metal springs, but lubrication problems have led more recently to the use of rubber inserts and bushes of various forms. The gearwheel illustrated is a new design developed by Alfred Wiseman & Co. Ltd., Glover Street, Birmingham, 9, and presents novel constructional features.

In this gearwheel the resilient members are made up of Silentbloc units, each member consisting of three units. The centre and widest unit of each member is pressed into a hole in the gearwheel rim; the two narrower outer units are located similarly in corresponding holes in the hub portion of the wheel. A ground steel pin is assembled in the bores of the three units constituting a member, and transmits the drive in double shear.

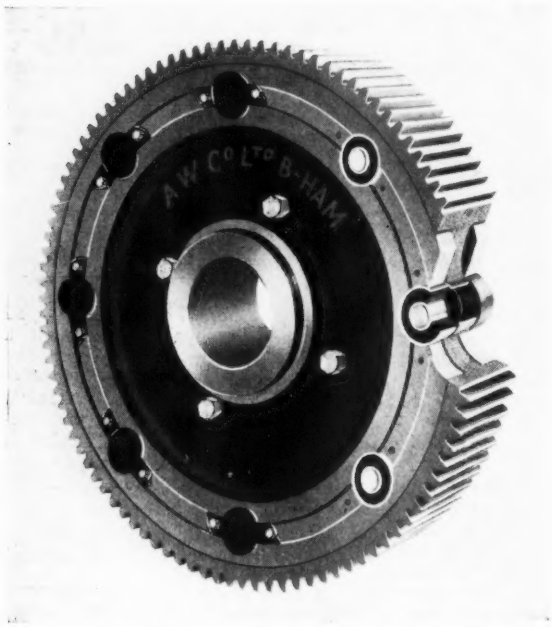
The arrangement described, and shown in the diagram, gives a high degree of resilience, the total available being the sum of the deflection of the three Silentbloc units in each resilient member. More torsional displacement between rim and hub for a given diameter of Silentbloc can be obtained in this way than is possible when a resilient member is located in the rim portion of a wheel only.

Two important mechanical characteristics of the gearwheel are seen in the drawing. The rim is a continuous "tee" section, and claimed to be stronger than a rim with lugs at intervals to take the resilient members. Although the hub member is made in two parts, no load is taken in service by the fitted bolts which pass through them. The two parts of the hub are accurately spigoted together, and the bolts are merely for location purposes during assembly.

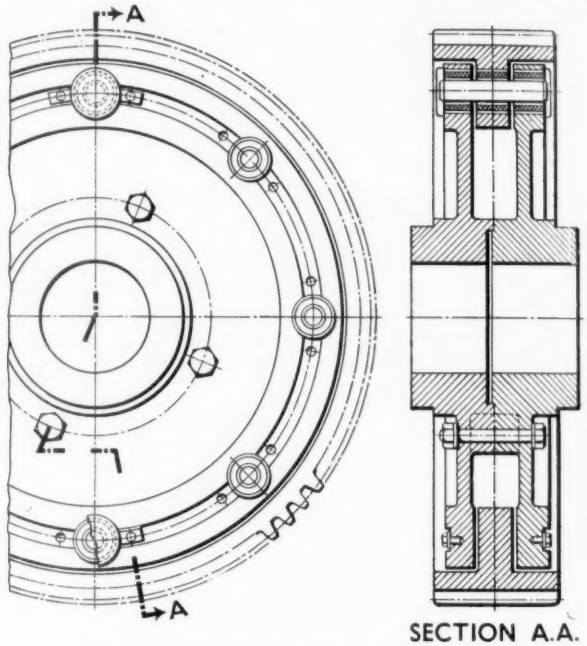
The number of resilient members employed depends on the loads imposed on the gears, and is not limited. With the resilient gear in question a large number of resilient members can be employed—the only limitation being the provision of sufficient material in the steel inner and outer wheel parts between the resilient members. Each unit of a member is a press fit in its hole in hub or rim, but retaining plates are provided as a precaution to hold the units in place. The Silentbloc units themselves consist of inner and outer steel tubular members between which a pre-stressed rubber bush is interposed. Any member can be removed from the wheel by taking off the retaining plates and pressing out the complete assembly of three units and the pin by means of a simple extracting tool. No disturbance of the other members is involved in this process.

Gearwheels of this new type are in use already by transport undertakings in Great Britain and on the Continent. An important forthcoming locomotive application will be in the 40 North British/G.E.C. electric locomotives now under construction for South Africa at the works of the North British Locomotive Co. Ltd. in Glasgow. These machines, rated at 3,030 h.p., are believed to be the most powerful electric locomotives ever built for a 3 ft. 6 in. gauge railway.

In addition, this type of gear is to be used on 25 general purpose diesel-electric locomotives being built by the Brush Electrical Engineering Co. Ltd., Loughborough, for the Ceylon Government Railway. These locomotives are rated at 1,000 h.p. and have four motors each.



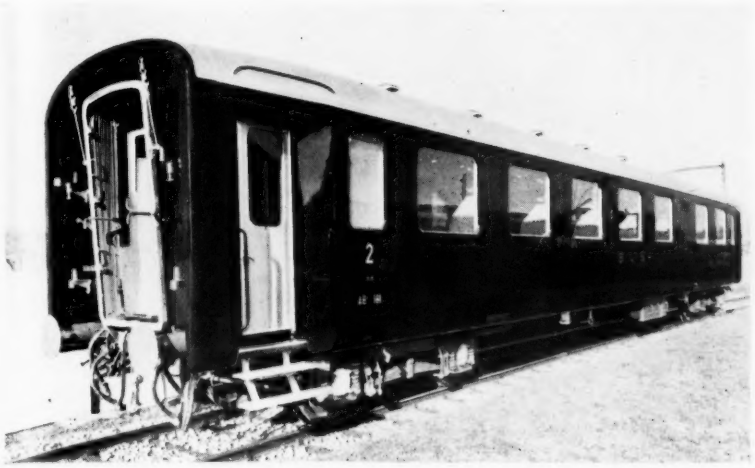
Gearwheel cut away to show assembly of Silentbloc bushes forming a resilient member



Constructional details of resilient gearwheel showing continuous "tee" section of rim

New Stock for the Lötschberg Railway

Six-compartment type coaches for international services embodying features new to Swiss practice



First and second class coach for international services, Berne-Lötschberg-Simplon Railway

THE first of six light-steel composite first and second class bogie coaches for international traffic ordered by the Berne-Lötschberg-Simplon Railway in 1948 from Wagon- und Aufzugsfabrik Schlieren (Zurich) has been delivered and is now undergoing test runs in France.

The coach is of the corridor type with seven compartments, five second class and two first class, and is the first coach for international services built in Switzerland to conform to the most recent I.U.R. regulations for passenger rolling stock on international trains. It thus differs from the usual type of light steel carriage in Switzerland in having end vestibule side doors instead of side doors giving access to vestibules in the centre of the vehicle and half-way between it and the ends of the vehicle.

The measurements of the coach also comply with international regulations and the principal dimensions are as in the table below:—

Length over buffers	75 ft. 7½ in.
Length overall	71 ft. 4½ in.
Height, rail to top of roof ...	12 ft. 9½ in.
Width of compartment	6 ft. 2½ in.
Width at waist	9 ft. 8⅝ in.
Bogie wheelbase	8 ft. 10¼ in.
Weight	33 *tonnes*

All compartments, whether first or second class, are of the same dimensions, with accommodation for six passengers each. The two first class compartments have wood panelling and the walls of the second class compartments are covered with rexine. Differing from the usual practice, there is no door separating the first class portion of the corridor from the second class portion, but doors swinging both ways are provided at both ends of the corridors to separate the latter from the two spacious end vestibules, each including a lavatory. Total accommodation is for 42 passengers, 12 first class, and in each vestibule is a collapsible seat. Two original oil paintings, the work of Swiss painters, adorn the first class compartments.

Steam and Electric Heating

To conform to international regulations for the heating of new rolling stock, equipment had to be provided for both steam and electric heating, the latter for use with alternating current 1,000 volt, 16⅔ cycles and 50 cycles) and direct current. With the direct current provision had to be made for 1,500-volt tension as used in France, and for 3,000-volt tension as used in Italy.

The development of suitable universal equipment is stated to have been a particularly complex problem successfully overcome by Brown Boveri, of Baden (Switzerland), which supplied the installation. The same equipment operates also the air-conditioning plant. For protection the whole equipment has been installed in a separate compartment between the first and the second class compartments.

If required, the seats can be converted into couchettes, and bed linen, a pillow and two blankets per passenger are supplied. The extra fee for a couchette service in Switzerland is 3 centimes a km.

A new feature is the extension of the side walls beyond the end walls and along the buffers to minimise air resistance between the coaches while the train is in motion. This is the first coach with these aerodynamic wings built in Switzerland, although the French and Italian railways own a number of such coaches. The livery is dark green.

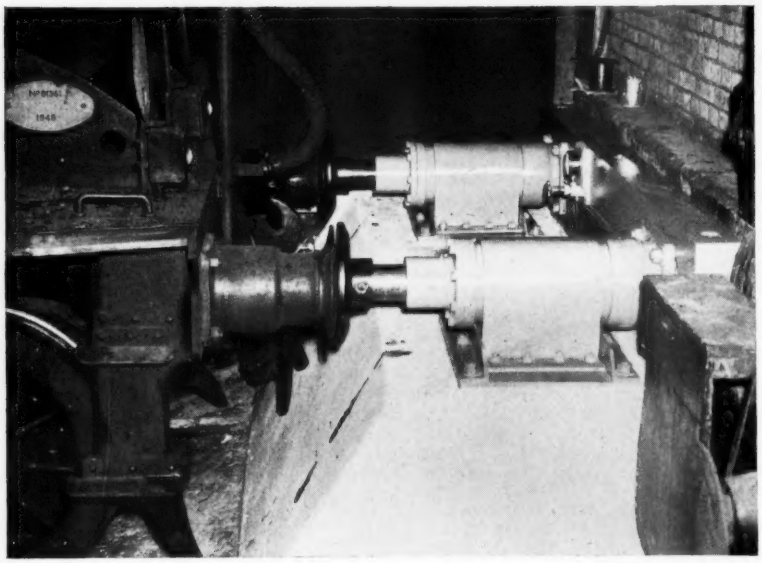
There are an Oerlikon automatic brake, a quick-acting brake, and a regulating brake. The maximum speed for which the coach has been built is 99¼ m.p.h., but as there is no suitable stretch of line in Switzerland for experiments at such speeds, the coach has been sent to France where tests are being carried out in collaboration with the French National Railways with a view to studying the riding qualities of the coach at high speed.

The five remaining coaches of the order are to be delivered within the next few weeks and are to be placed in service on the Calais-Basle-Berne-Milan-Genoa route. These six coaches are intended to replace some of the 32 wooden bogie coaches which the Lötschberg Railway placed in service in 1914 and have been gradually withdrawn from the international service. Most have been converted into non-compartment coaches with central gangway for Switzerland only.

Second class compartment

A Pneumatic Buffer Stop

Design in which an air cushion absorbs buffing loads and shocks

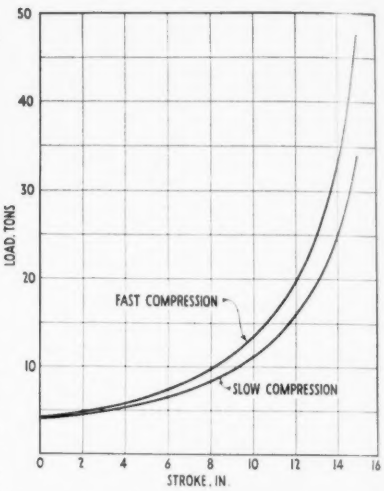


A PNEUMATIC buffer stop, which is claimed to be the first of its type, has been installed by the Eastern Region of British Railways at Liverpool Street Station. Among the advantages claimed for this stop, which was designed by Geo. Turton, Platts & Co. Ltd., Sheffield, is flexibility and resilience, great capacity for energy absorption, low recoil and dissipation of absorbed energy, adaptability to existing buffer plungers and casings, and simplicity of construction, with no breakable parts.

The principle on which it operates is to absorb buffing loads and shocks on a cushion of air and control the release of energy absorbed during compression to minimise the recoil force. The first essential is to maintain a determined volume of air at a pre-determined initial pressure in the cylinder under all conditions, *i.e.*, static load, high compression, and against atmospheric temperature changes, which is effected by means of a pressure balanced piston.

Pressure balance is obtained by the air pressure in the cylinder operating on a supplementary piston in the buffer piston head, transmitting pressure to a small quantity of oil which is ported to an annulus between the buffer piston seals and the cylinder wall, so that the seal is always under opposing pressures; oil on one side and air on the other.

For initial loading or servicing the piston head is first filled with oil through a Schrader valve with a hand gun, and the air chamber is filled with air to a determined pressure through a second Schrader valve using a motor tyre pump. The recoil energy is controlled by a mitre faced valve which opens under pressure greater than the initial pressure, admitting air into the recoil chamber, and which closes when the load is removed, balance of pressure in the two air chambers is restored by a small communicating passage in the valve. In considering the application of the pneumatic buffer for rolling stock the original design has been improved by incorporating in the buffer

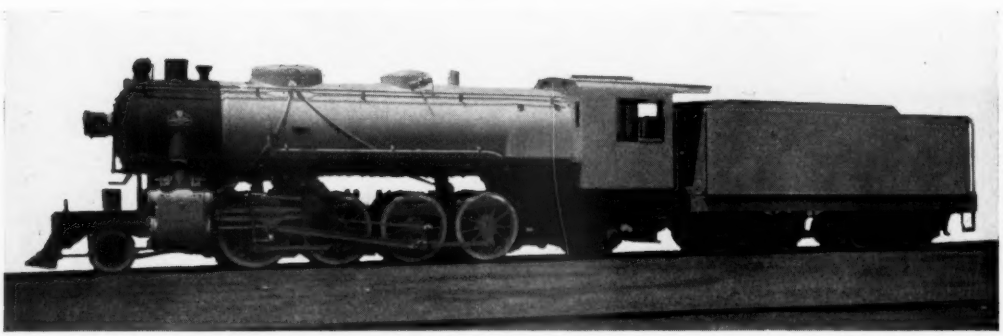


Theoretical loading curves

an automatic air pump, using the working or buffing stroke to maintain the determined pressure. A relief valve is provided in the assembly.

The component parts of the pneumatic buffer are manufactured from weldless steel forgings, and the cylinders are honed to a limit of .00025 in. The piston seats are of resinoid plastic, finished to close tolerances, providing non-metallic contact with the high-tensile steel cylinder bore.

American-Built 2-8-2 Locomotive for India



One of 33 2-8-2 *type locomotives recently built by the Baldwin Locomotive Works, United States, for the Indian Supply Mission. The locomotives are for freight service on metre-gauge lines and have* 16 *in. by* 24 *in. cylinders and* 4 *ft. dia. driving wheels; tractive force is* 20,100 *lb.*

RAILWAY NEWS SECTION

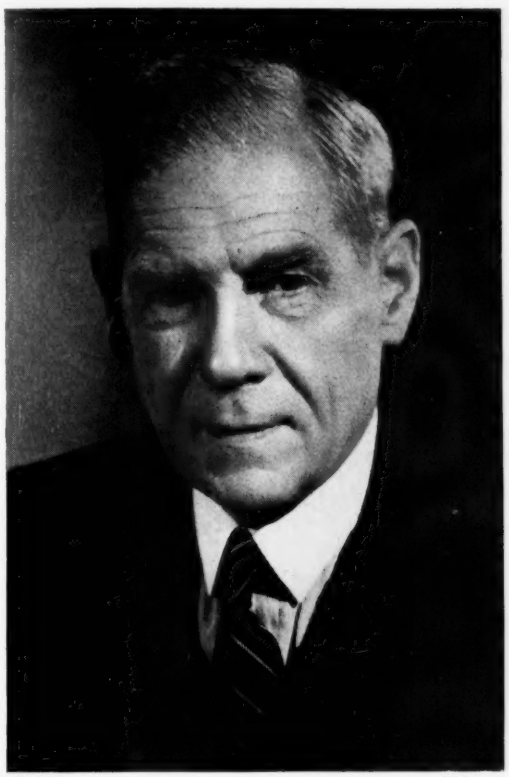
PERSONAL

Sir Cyril Hurcomb, Chairman of the British Transport Commission, who is visiting Sweden and Norway, had the honour of being received by the King of Norway, last week, and of lunching with him at the Royal Summer Residence.

Lt.-Colonel C. P. Dawnay has been appointed a Director of the Gloucester Railway Carriage & Wagon Co. Ltd.

Ministry of Shipping in October, 1939, Sir Cyril Hurcomb was made Director-General, and, from the amalgamation of that Ministry and the Ministry of Transport in 1941, served as Director-General of the Ministry of War Transport; from 1946, until his appointment as Chairman of the British Transport Commission in 1947, he was Secretary to the Ministry of Transport. Sir Cyril Hurcomb was President of the Institute of Transport for the year 1935-36.

& Wagon Co. Ltd., the Leeds Forge Co. Ltd., and the Newlay Wheel Co. Ltd., the controlling interests in which had been acquired by Cammell Laird & Co. Ltd. On the formation in January, 1929, of the Metropolitan-Cammell Carriage & Wagon Co. Ltd., as a result of the amalgamation of the carriage and wagon building interests of Vickers Limited and Cammell Laird & Co. Ltd., Mr. Boyd became a Director of the new combined undertaking, with charge of the London office and the sales of the



Photo] [*Bassano*

Sir Cyril Hurcomb

Chairman, British Transport Commission, who is created a Baron

Mr. Archibald J. Boyd

Chairman, Railway Carriage & Wagon Builders' Association, who receives a Knighthood

Sir Cyril Hurcomb, G.C.B., K.B.E., Chairman of the British Transport Commission, who, as recorded in our June 9 issue, is created a Baron in the King's Birthday Honours List, was born in 1883, and was educated at St. John's College, Oxford. In 1905 he entered the service of the Post Office in the Surveyor's Department, and in the next year was transferred to the Office of the Secretary. He became Private Secretary to the Permanent Secretary in 1910, and Private Secretary to the Postmaster-General in 1911. He was later Deputy-Director, and subsequently Director, Commercial Services, Ministry of Shipping. He joined the Ministry of Transport on its formation in 1919 as Assistant Secretary in the Finance, Rates & Statistical Department, and he was Secretary of the Ministry from 1927 to 1937. In May, 1937, he was appointed an Electricity Commissioner, and he became Chairman of the Electricity Commission at the end of that year. On the formation of the second

Mr. Archibald J. Boyd, Chairman, Railway Carriage & Wagon Builders' Association, who, as recorded in our June 9 issue, receives the honour of a Knighthood in the King's Birthday List, is Managing Director of the Metropolitan-Cammell Carriage & Wagon Co. Ltd. He was born in 1888 and was educated at Harrow and Trinity College, Oxford. Entering the steel works of Cammell Laird & Co. Ltd. as a pupil, he passed through the various departments and became Assistant London Manager of the company in 1913. In 1914 Mr. Boyd went on active service as an officer of a Territorial battalion, but in 1916 was recalled from France and became Assistant General Manager of the new works which had been built by Cammell Laird & Co. Ltd., at Nottingham, for the manufacture of shells, and, afterwards, guns. In 1919 he returned to London as Assistant Manager, becoming London Manager in 1921, and a local Director of Cammell Laird in 1925. In the same year he was elected a Director of the Midland Railway Carriage company. In 1934 he became Managing Director of the company. Among other positions Mr. Boyd holds are those of Managing Director of the Midland Railway Carriage & Wagon Co. Ltd., and the Patent Shaft Axletree Co. Ltd.; Director of the Associated Electrical Industries Limited, Metropolitan-Cammell-Weymann Motor Bodies Limited, Taylor Brothers & Co. Ltd., George Stephenson & Co. Ltd., and Monks Investment Trust Limited; Chairman of G. H. Sheffield & Co. (Engineers) Ltd. During the recent war 80 per cent. of the capacity of the Metropolitan-Cammell Carriage & Wagon Co. Ltd. was devoted to tank production. From October, 1942, to December, 1943, Mr. Boyd served as Director-General of Tank Production in the Ministry of Supply; he was also after the recent war a Member of the Overseas Trade Development Council, which was formed by the President of the Board of Trade. Mr. Boyd became Chairman of the Railway Carriage & Wagon Builders' Association in 1929..

Mr. H. A. Johnson, M.I.Mech.E., M.I.Loco.E., M.Inst.T., retired from the position of Chief Mechanical Engineer, Gold Coast Railway, on June 1.

The Minister of Transport announces that Mrs. Ella Gasking has accepted his invitation, made after consultation with the British Transport Commission, to become a Whole-Time Member of the Hotels Executive. Mrs. Gasking has been serving as a Part-Time Member of the Hotels Executive since its inception in May, 1948.

Mr. G. L. Wareham has been appointed Publicity Manager to the Skefko Ball Bearing Co. Ltd., Luton.

Mr. James R. Johnston has been appointed Inspector, Pacific Region, Canadian Pacific Railway, with headquarters at Vancouver.

British Railways announce that Mr. D. Fenton, Assistant District Operating Superintendent, Lincoln, has been appointed Assistant District Operating Superintendent, Manchester.

The Road Haulage Executive announces that Mr. H. R. Lansdown, of the Valuations Department at Headquarters, has been promoted to the post of Divisional Stores Officer for the Eastern Division.

The Railway Executive, Scottish Region, announces that Mr. W. Sidwell, Assistant District Motive Power Superintendent, Wellingborough, has been appointed Assistant District Motive Power Superintendent, Carlisle (Kingmoor).

Mr. Lewis Hart has been unanimously elected to the Council of the Incorporated Society of Advertisement Consultants. He has been a Member of the Society since 1935 and has now been granted a Fellowship. Mr. Hart is Manager of the Brush Electrical Engineering Co. Ltd., and a Member of the Publicity Committee of the British Electrical & Allied Manufacturers Association.

London Midland Region Appointments

The following staff changes are announced in the London Midland Region of British Railways:—

Mr. W. C. Mullenger, Divisional Controller (Passenger Services), Divisional Operating Superintendent's Office, Derby, to be Divisional Controller (Freight Services), Divisional Operating Superintendent's Office, Derby.

Mr. W. Bramley, District Motive Power Superintendent, Bletchley, to be District Motive Power Superintendent, Derby.

Mr. R. L. E. Lawrence, Trains Assistant to Divisional Operating and Commercial Superintendents, York (North Eastern Region), to be District Operating Superintendent, Liverpool Central (C.L.).

Mr. F. T. Roberts, Chief Staff Clerk, Civil Engineer's Office, Euston, to be Staff and Organisation Assistant, Civil Engineer's Office, Euston.

Mr. George B. Howden, M.I.C.E., M.Inst.T., General Manager, Great Northern Railway (Ireland), who, as recorded in our June 9 issue, has also been appointed General Manager, Coras Iompair Eireann, received early training on the North British Railway at Glasgow. After extensive experience on constructional and maintenance work he was, towards the end of 1926, appointed District Engineer on the Border District of the Scottish Area, L.N.E.R., with Headquarters at Carlisle. In 1928 he was appointed Assistant Engineer, Scottish Area in Edinburgh. In 1929,

Photo] [Lafayette

Mr. George B. Howden

Appointed General Manager, Coras Iompair Eireann

Mr. Howden took up the position of Chief Engineer, Great Northern Railway (Ireland), on the retirement of the late Mr. F. A. Campion. In 1933 he became responsible, in addition, for the Mechanical Engineer's Department, filling the dual position of Civil and Mechanical Engineer until his appointment as General Manager of the company in 1939. One outstanding work undertaken by Mr. Howden was the reconstruction of the Boyne Viaduct at Drogheda about 15 years ago, which was carried out without interruption of traffic. During his term as Chief Engineer many notable improvements were effected in the provision of new passenger coaches, dining cars, buffet cars, and the remodelling of refreshment rooms, restaurants and hotels. The company's road passenger services have been systematically developed and a fleet of 150 passenger and 130 motor-lorry vehicles is now operated in districts as far apart as the Counties of Dublin and Donegal. In the development of diesel railcars and railbuses the Great Northern has made considerable progress. These types of vehicle have been introduced extensively; the latest acquisition by the company being a fleet of 20 new railcars, each seating 44 passengers in two classes, and when these have been fully delivered the company will have about 30 railcars in operation apart from a number of railbuses.

Mr. T. P. James has been appointed General Superintendent, Sleeping, Dining & Parlour Car Department, Prairie and Pacific Regions, Canadian Pacific Railway. Mr. S. T. McBain has been appointed General Superintendent of the department for the C.P.R., Eastern Region.

London Transport announces the appointment of Mr. H. A. Wickham to the position of Permanent Way Engineer (Trams).

Mr. C. Pinkham, Manager of the Publicity Organisation of the General Electric Co. Ltd., is retiring on June 30.

London Transport announces the appointment of Mr. H. E. Styles, B.Sc., A.R.I.C., to the post of Superintendent of Laboratories. He entered the service of the London General Omnibus Company in 1927 and gained wide experience in the various sections of the laboratory at Chiswick. In 1940 he became Assistant to the Chief Chemist and later to the Superintendent of Laboratories.

The British Iron & Steel Research Association announces that Mr. E. T. Judge, Director of Dorman, Long & Co. Ltd., has retired from the Chairmanship of the Plant Engineering Panel of the Association; this is in conformity with the Association's policy of periodical retirement of all Committee members. Mr. J. F. R. Jones, Chief Constructional Engineer, John Summers & Sons Ltd., succeeds Mr. Judge as Chairman of the Panel.

Dr. S. Hulme, M.B., B.S., M.R.C.S., L.R.C.P., and Dr. G. P. Reed, M.B., B.S., M.R.C.S., L.R.C.P., D.R.H., have joined the staff of the Chief Medical Officer, Southern Region. Dr. Hulme served with the R.A.M.C. during the war and on demobilisation studied medicine and qualified at St. Mary's Hospital, London. Dr. Reed qualified at Liverpool University and served in the Air Force during the war.

With the concurrence of the Railway Executive, Mr. A. Endicott, M.B.E., F.R.I.C.S., Chief Estate & Rating Surveyor, Railway Executive, has accepted the invitation of the Government to sit as a member of the committee which, on the recommendation of the Chorley Committee on Higher Civil Service Remuneration, is to be set up to consider the organisation, structure and remuneration, on a common basis, of the works group of professional classes in the Civil Service (that is, Architects, Surveyors and Engineers). Mr. Endicott has been elected a Vice-President of the Royal Institution of Chartered Surveyors.

The King's Birthday Honours List

The following is a selection, further to that published in our last week's issue, of honours of transport and industrial interest from the King's Birthday list:—

Knights Bachelor

Mr. Herbert Henry Harley, C.B.E., Chairman, Coventry Gauge & Tool Co. Ltd.

Mr. George Legh-Jones, M.B.E., a Managing Director, Shell Transport & Trading Co. Ltd.

Mr. Herbert Henry Merrett, J.P., for public services in South Wales.

K.C.B.

Sir Ben Lockspeiser, LL.D., M.I.Mech.E., F.R.Ae.S., F.R.S., Secretary, Department of Scientific & Industrial Research.

C.B.

Mr. Percy Faulkner, Under-Secretary, Ministry of Transport.

C.M.G.

Mr. Robert Hall Chapman, M.E., M.I.E. (Aust.), Railways Commissioner, State of South Australia.

Mr. Ronald Johnstone Hillard, General Manager, Sudan Railways.

O.B.E. (Civil Division)

Mr. Benjamin Vernon Bradforth, M.I.C.E., Senior Engineer, Ministry of Transport.

Mr. Charles Frederick Brown, M.B.E., Principal, Ministry of Transport.

Mr. Thomas Davidson, Resident Engineer, East African Railways & Harbours.

Mr. Edwin Herbert Edlin, Chief Executive Officer, Ministry of Transport.

Mr. Dennis Clark Epsley, D.Eng., M.I.E.E., Senior Telecommunications Engineer, Research Laboratories, General Electric Co. Ltd.

Mr. William Hay Glass, Technical Director, Thermotank Limited, Glasgow.

Mr. Ernest Walter Godfrey, Principal, Ministry of Transport.

Mr. Christopher Dan James, Principal, Department of Scientific & Industrial Research.

Mr. George Ivor Rushton, Director and General Works Manager, Whitehead Iron & Steel Co. Ltd., Newport.

Mr. Ernest Victor Swallow, Assistant Chief Docks Manager, South Wales Docks, Docks & Inland Waterways Executive.

M.B.E. (Civil Division)

Mr. George Winter Anson, Assistant District Operating Superintendent, Hull, Railway Executive.

Mr. George William Battensby, Traffic Manager, Northern General Transport Co. Ltd.

Mr. Arthur Cecil Birkinshaw, Higher Executive Officer, Ministry of Transport.

Mr. Bernard Palmer Blackburn, District Motive Power Superintendent, Carlisle, Railway Executive.

Mr. Cyril Dan Bucknell, Senior Executive Officer, Ministry of Transport.

Mr. Gerald Crabtree, District Operating Superintendent, Edinburgh, Railway Executive.

Mr. Arthur Leonard Day, District Traffic Superintendent, District and Piccadilly Lines, London Transport Executive.

Mr. Alexander Charles Eagle, Chief of Freight Section, Southern Region, Railway Executive.

Mr. Reginald Maurice Hill, T.D., Higher Executive Officer, Ministry of Transport.

Mr. Joseph Harold Jeffs, Bolt Works Manager, Guest, Keen & Nettlefolds (Midlands) Limited, Darlaston, South Staffordshire.

Mr. Vivian Joseph Maingot, Railway Accountant, Trinidad.

Mr. Frank Salton Marsh, M.Sc., Technical Adviser, Chesterfield Tube Co. Ltd.

Mr. Edward Wharton Marvill, A.M.I.Mech.E., Works Superintendent, F. Perkins Limited, Peterborough.

Mr. Robert Oakley, Senior Executive Officer, Ministry of Transport.

Mr. Henry Christopher Tryon, M.I.Mech.E., Research Engineer, D. Napier & Son Ltd., Acton.

Mr. Harry Stewart Wallis, Higher Executive Officer, Ministry of Transport.

Mr. Frederick Sidney Whitehead, Manager, Statistics Department, British Iron & Steel Federation.

Companion, Imperial Service Order

Mr. Charles Coates Whittington, lately District Traffic Superintendent, Nigerian Railway.

Mr. Edmund A. Watson has been appointed General Improvement Engineer of the American Car & Foundry Company, from June 1, in succession to Mr. John W. Sheffer, who has retired after 42 years' service with the company.

Sir Edward Appleton has been awarded the Gold Albert Medal of the Royal Society of Arts for 1950, with the approval of Princess Elizabeth, President of the Society.

Dinner to M. Lemaire

Sir Eustace Missenden, Chairman of the Railway Executive, with Mr. David Blee, Member, Railway Executive, and Headquarters and Regional officers of British Railways, gave a dinner at the Hotel Metropole, Brighton, on June 7, to M. Lemaire, President, the International Union of Railways, and Mme. Lemaire.

South African Railways

The following South African Railways appointments have been made:—

Mr. D. M. Robbertze, Chief Commercial & Industrial Manager, Headquarters, to be Assistant General Manager (Commercial), Headquarters.

Mr. J. Viljoen, Chief Operating Manager, Headquarters, to be Assistant General Manager (Operating), Headquarters.

Mr. P. J. Louw, Chief Civil Engineer, Johannesburg, to be Assistant General Manager (Technical), Headquarters.

Institution of Railway Signal Engineers

Effect of introduction of flat-bottom track on signalling work

At a meeting of the Institution of Railway Signal Engineers in London on April 14, Mr. J. H. Devine, Railway Executive, read a paper dealing with the introduction of flat-bottom rails in Britain and its effect on signalling. Mr. F. Horler, President, was in the chair.

The paper, which was illustrated by slides, dealt with the historical facts involved and the steps taken in connection with the first trials of the new track and the subsequent decisions concerning standard designs. The effect on track circuit operation and the design of insulated rail joints and bonds were discussed, as well as problems arising from the difficulty of fixing locking bars under the new conditions. The important point concerning the thrust required to work switches in flat-bottom rails was dealt with at length.

In opening the discussion, Mr. J. F. H. Tyler criticised some of the details connected with the introduction of the new track, and suggested that the reduction in the section of the stretcher rods did not appear to be altogether satisfactory. The small clearance between stock rail and switch rail seemed to be likely to cause difficulty if foreign bodies fell on to the track. He mentioned that much greater clearance was provided on French railways.

Mr. J. H. Currey said that the L.M.S.R. and L.N.E.R. had made combined experiments and tests made with various lengths of rodding had provided interesting results concerning the effect produced when the signalman operated the levers. The method used for transmitting the effect at the points was important if satisfactory action of the stretchers was to be obtained. Experiments showed that the dynamic effect imparted to the rodding by the signalman made things easier than had been thought. Tests with a 113-lb. rail crossover were made with various arrangements of rodding. He thought that it was better to put copper wire bonding behind the fishplates.

Mr. P. A. Langley considered that relaying with flat-bottom rail often necessitated alterations in the signalling apparatus and sometimes the use of track circuits in place of locking bars. Certain entirely new problems arose. Some form of approach locking probably would be needed in some cases, as there would not be sufficient length of track available in rear of the points. Special fishplate joints would be necessary to allow a lifting bar to work in conjunction with facing points. No attempt had been made to fix bars to the switches; presumably it was thought that too great a drag would result. Transition joints had also to be kept clear of bars; filler blocks between running and check rails also caused difficulties.

Ministry of Transport Requirements

Lt.-Colonel G. R. S. Wilson, Chief Inspecting Officer of Railways, Ministry of Transport, spoke of the revised issue (the first for some 25 years) of the Ministry of Transport requirements, which was about to be published. The 350-yd. manual point operating limit had been retained therein. He thought it might not prove possible in practice to go so far with f.b. track. Lt.-Colonel Wilson welcomed the use of heelless switches and compared British and foreign practice.

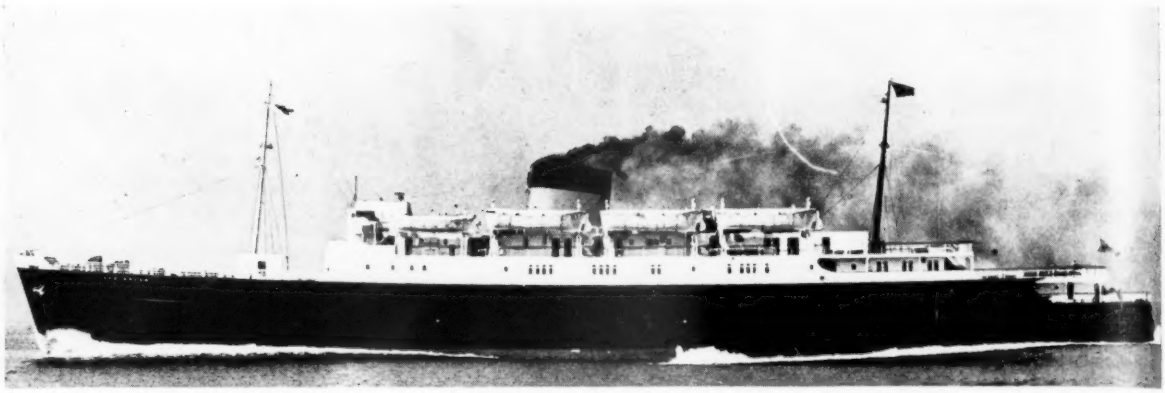
Mr. D. H. Vernon, Australian Section of the Institution, said that in Australia f.b. track was used only on the New South Wales Government Railway. In N.S.W. they considered the protection of the switch point important. Points up to 1,200 ft. from the signal-box were operated mechanically; switches with heels and spiked track were used, and it was important that spikes, or other fastenings, did not project into the ballast.

Mr. R. A. Pascall mentioned the short bonds mounted on the head of the rail used in America. He thought it possible to make the insulated joints without the large rail holes that had been mentioned by Mr. Devine.

In conclusion, Mr. Devine replied to the points raised in the discussion.

Another Steamer for Harwich-Hook Service

Ample first and second class sleeping accommodation and extensive cargo space



The *Amsterdam*, the second of the new turbine steamers for the Harwich-Hook service which was launched at Clydebank last January, has now been completed, and went into service on June 11. She is, so far as general dimensions are concerned, a sister ship of the *Arnhem*, which has been carrying on the service in conjunction with the *Duke of York*, which is now being withdrawn, and after reconditioning at Belfast will develop the new service of the Southern Region of British Railways between Southampton and Cherbourg.

The first of these two new ships, both of which have been built by John Brown & Co. Ltd., was designed for a one class ship, that is to say, she had various grades of cabins, but a common lounge, dining room, and so on. Experience showed that it was advisable to modify this arrangement and as far as possible to convert her into a two-class ship. This arrangement has been more decisively adopted in the *Amsterdam* and she was designed to carry first and second class passengers.

Passenger and Cargo Accommodation

There is sleeping accommodation in the first class for 321 persons. There are four cabins de luxe, each with twin beds and private bathroom, 56 single-berth cabins, 22 special two-berth cabins with cot beds, and 101 two-berth cabins with Pullman type berths, eleven of which are fitted with an additional settee berth. The vessel has a gross tonnage of 5,000, an overall length of 377 ft., and a service speed of 21½ knots.

Sleeping accommodation for the second class comprises 48 two-berth cabins and 35 four-berth cabins carrying a total of 236. All cabins in both classes are fitted with hot and cold running water with Thermo Reg ventilation and heating with individual control in each cabin. The four-berth cabins each have two wash basins with hot and cold running water.

The first class lounge on the promenade deck extends the full width of the vessel, and has seating accommodation for 150, with a cocktail bar. The first class dining saloon, which seats 30, is in the starboard side and has entry from the lounge. The second class dining saloon is on the port side and there is a central galley and pantry serving both dining rooms and the first class lounge.

Provision for cargo totals 24,000 cu. ft., and there is also a baggage and mail compartment of 8,500 cu. ft. capacity. At the after end there is a motorcar and cargo space of 13,300 cu. ft.

At an inaugural lunch held on the *Amsterdam* at Harwich on June 6, Mr. V. M. Barrington-Ward, Member of the Railway Executive, presided, and the toast of the company was proposed by Captain P. D. F. R. Pelly, D.S.O., R.N., Senior Officer, Reserve Fleet, Harwich. Captain C. R. Baxter, Master, replied.

The toast of British Railways was proposed by Mr. D. M. de Smit, Commercial Counsellor in London to the Royal Netherlands Embassy. Mr. Barrington-Ward, replying, said that it had been hoped to arrange for the *Amsterdam* to visit the city in Holland after which she was named, but for reasons of economy that project had had to be dropped.

In its place, arrangements had been made to welcome the Burgomaster of Amsterdam and Mr. den Hollander, President of the Netherlands Railways, to attend a ceremony at the Hook of Holland on June 22, when they would unveil two plaques on board the ship.

Mr. Barrington-Ward said that the cross-Channel ships were the most profitable section of British Railways today and the Harwich-Hook service was the most profitable of them all. The *Amsterdam*, he added, was the first capital ship designed and constructed entirely under the regime of British Railways, and the *Amsterdam* and *Arnhem* would have the strenuous task of keeping that service going for seven nights a week.

Among those who accepted invitations were:—

Railway Executive: Messrs. E. G. Marsden, Secretary; A. J. Pearson and J. L. Harrington, Chief Officers (Administration); R. H. Hacker, Chief Officer (Continental); O. H. Corble, Chief Officer (Marine); D. S. M. Barrie, Public Relations Officer.

Eastern Region, British Railways: Messrs. L. H. K. Neil, Continental Traffic Manager; A. R. Dunbar, Divisional Operating Superintendent; C. G. G. Dandridge, Commercial Superintendent; Captain R. Davis, Marine Superintendent (Parkeston); W. S. Dawson, Marine Superintendent Engineer (Parkeston); M. B. Thomas, Public Relations & Publicity Officer.

Others present included Messrs. P. Deshayes, Managing Director, French Railways Limited, London; A. Mertz, Belgian National Railways, London.

Mr. V. M. Barrington-Ward, Member of the Railway Executive, speaking at the luncheon. On his left are Mr. D. M. de Smit, Commercial Counsellor in London to the Royal Netherlands Embassy, and Mr. C. K. Bird, Chief Regional Officer, Eastern Region, British Railways

London Area Passenger Charges Scheme

Conclusion of case for the British Transport Commission: Estimated effect of abolition of petrol rationing

The Transport Tribunal, under the presidency of Sir W. Bruce Thomas, K.C., resumed its inquiry on June 7 into the London Area (Interim) Passenger Charges Scheme. This was the thirteenth day of the inquiry which is expected to continue for at least a month more.

Mr. G. R. Rougier, for the Southend Railway Travellers Association, suggested that the proposed limit of 50 per cent. increase on workmen's fares over 4d. should be reduced to 25 per cent. for distances over 20 miles. He said that if the scheme was modified in this way it would have the effect of reducing the weekly increase for travellers from Southend from 7s. 6d. to about 4s.

Mr. A. B. B. Valentine, Member of the London Transport Executive, replied that, while the proposal was a practicable one, it infringed the principle of equal pay for equal distance.

In reply to Mr. Colin H. Pearson, K.C., for the B.T.C., who referred to the drop in Whitsun receipts compared with corresponding period for last year, Mr. Valentine said that an adverse factor which caused this drop was the abolition of petrol rationing and the competition of the private motorcar. Competition from private motoring must be very substantial, and, though it was not practicable to make any exact calculations, the estimate he would say would be not less than £1 million or even as much as £1½ million in the first year of the proposed new fares scheme.

Mr. A. E. Sewell, Member of the Tribunal, asked Mr. Valentine if he had endeavoured to calculate lost fares, and said he felt there must be a fairly high gap.

Mr. Valentine: We are constantly trying to get at that and the causes for lost fares. There is, undoubtedly, a considerable loss, but on the evidence we have, I do not think it would be right to try to assess the exact figure.

This concluded the case for the British Transport Commission. Mr. Valentine, who has spent eleven days in the witness chair, was thanked by the President on behalf of the Tribunal for presenting such a complete and comprehensive survey of traffic in the London area.

Choice of Route

Mr. S. W. Hill, financial adviser to local and public authorities, called on behalf of the Middlesex County Council, said he thought differences in charges on alternative routes had been sufficiently great in the past to provide inducements to certain classes of passengers to choose a particular route. To remove that variation by means of fares equalisation might result in a certain shifting from one form of transport to another.

Mr. Hill said that in his opinion, if the increases in the scheme were approved, because of the close budgeting of workers today, it would almost certainly lead to claims for increased wages.

Next day, dealing with the B.T.C. system of accountancy and the evidence given by Mr. R. H. Wilson, Comptroller, Mr. Hill referred to the provision of a reserve for assets that become obsolete.

In every undertaking, he said, there was always the risk of some obsolescence taking place over and above depreciation, but it was impossible to suggest that the whole of the assets of the British Transport Commission were likely to become obsolete.

He maintained that there was no financial case for an overall increase in London fares. He agreed that the proposals for introducing a universal early morning return on the road services—trams, trolleybuses, and buses—and a few consequential alterations to charges on the trolleybuses, should be given effect. If it were assumed that an extra £3½ million were required above the present levels, then the limited raising of sub-standard fares should have first priority on the list, and not the increases in the bus fares and the workmen's fares generally.

The concession to make the day return available at all times of the day was not merited because it would have a disadvantageous effect elsewhere on peak loads. Nor was he satisfied that concessions to the ordinary suburban rail season ticket holder should be made unless accompanied by concessions instead of penalties on workmen's.

Replying to further cross-examination by Mr. Lionel Heald, K.C., for the B.T.C., Mr. Hill said he agreed with the figure of £80·5 million as the estimated yield from the scheme, if accepted, subject to the possibility of increased revenue from additional traffic that might be induced, but he did not agree that the increased tax on petrol would necessarily cost £1,500,000. It was absurd to talk of building up a reserve fund of £2 million from any surplus revenue from the London area when it would necessarily have to go to offset deficiencies in the other activities of the Commission.

The next witness was Mr. Isadore Isaac Ungar, Assistant Director of Housing, London County Council, who, referring to the L.C.C. housing programme, said it was inevitable that for many years large numbers of persons living on council estates would have to travel long distances to work. He had examined the London charges scheme and considered that transport facilities and fares were intimately bound up with the wide planning and social problems peculiar to London.

Their experience was that the people in the most need of housing were in the main those with the least income, and therefore, the hardship of the fare increases would be felt most by those at present without adequate accommodation, and who would find the fare burden crippling. People had to accept accommodation with awkward and expensive cross-journeys. There were at the present time 170,000 families on the L.C.C. waiting list for houses and applications were coming in at the rate of 1,000 a week.

Mr. Ungar, asked by Mr. Moelwyn Hughes, K.C., for the L.C.C., whether in his view increases in fares for essential travel would be reflected in an increase in the cost of living, said he thought it would be likely to result in pressure for wage increases. He did not know to what extent there would be an increase in the cost of living as such. The greater part of the increases proposed were to be obtained from most essential travel—workmen's tickets and season tickets. He stressed that the pressure for wage increases would have repercussions elsewhere and that the running of the scheme would mean that the London worker would lose. He thought it would be very difficult, if not impossible, to maintain a wage freeze in London.

Mr. Ungar then quoted, from a travel survey which showed that the average expenditure per worker of all classes in greater London who used public transport to get to work was 4s. 10d. a week. Speaking of the five-day season ticket and the cheap return fare at off-peak hours, proposed by the L.C.C., Mr. Ungar said that any reduction in revenue would revert to the Commission by way of a more extensive use of the off-peak facility. It would encourage the habit of travelling for social occasions. The council opposed any proposal which puts an overall additional burden on the travelling public at a time when every endeavour should be made to avoid any increases in charges affecting the cost of living.

The T.U.C. View

Mr. Arthur Deakin, General Secretary of the Transport & General Workers' Union, called as a witness on Tuesday, suggested a short-term subsidy to help the British Transport Commission to solve its financial difficulties. The T.U.C., he said, objected to the scheme on the grounds that in the national interest it was inexpedient to increase fares of important sections of the travelling public.

The General Council of the T.U.C. felt strongly that it was out of touch with reality to increase fares. There were probably more than 1½ million trade unionists in London affiliated to the T.U.C. and they represented a fair cross-section of the general public.

Mr. Deakin, continuing, said that the General Council urged the Tribunal to take into account the fact that the exceptional conditions which were held to justify the introduction of shift workers' ticket facilities still existed, and did not come to an end in 1945. Because of the economic situation many workpeople were deprived of making use of early morning cheap fares. In many cases this arose from a Government decision regarding load spreading taken in the interests of the nation as a whole. The need for load spreading was likely to persist and might last until 1952.

The General Council would view the withdrawal of shift workers' tickets with great alarm. Workers might well refuse to work shift work, and, altogether, it would interfere seriously in the spreading of the peak electricity loads. Increases in fares would undermine the policy of wage restraint recommended by the T.U.C., and any increase in fares would promote a demand for higher wages.

Replying to further questions, Mr. Deakin said the General Council felt that the problem of the deficit was a national one and the solution should be national in scope. The T.U.C. suggested that possible ways of tackling the problem nationally were by reducing operating costs, a national charges scheme, or a Government subsidy. The subsidy should be strictly limited in amount and should be conditional on the Commission preparing a national charges scheme or a series of schemes which would enable it to carry out its obligations under the Act.

Mr. John Parker, M.P. for Dagenham, giving evidence as President of the South Essex Traffic Advisory Committee, suggested that there should be a five-day season ticket to compensate for the proposed big increase in monthly season tickets.

British Automatic Co. Ltd.

Satisfactory surplus for the year, with dividend maintained and conservation of resources

The sixty-third annual general meeting of the British Automatic Co. Ltd. was held at Winchester House, Old Broad Street, on June 14. Mr. T. M. Till, Deputy Chairman & Deputy Managing Director, presided, Major R. D. K. Curling, Chairman & Managing Director, being absent through illness.

The Secretary, Mr. Ivan B. Lindley, read the notice convening the meeting.

The Chairman, in a statement issued with the report and accounts, said: In these days of controls of materials and of profit margins, it is never easy to foresee what will be the outcome of our endeavours. I am very happy to be able to report to you, therefore, that the trading results for the year 1949 can be regarded, in all the circumstances, as quite satisfactory.

In fact, as you will see from the accounts, the profits for the year leave quite a substantial surplus after payment of the usual dividend of 6 per cent. For several reasons, however, your directors have considered it advisable not to increase the rate of dividend. First, as soon as we are able to resume the sale of confectionery through our vending machines, considerable capital expenditure will be necessary to modernise our fleet of machines. For this, we must conserve our resources. Secondly, as I have already stated, there are not, in these days, the same assured and stable trading conditions as at one time prevailed, and we must be conservative in our outlook. Finally, any dividend paid in excess of that for last year would attract profits tax at the maximum rate of 30 per cent. In the circumstances, we feel that this money can be better used to the advantage of the shareholders by retaining it in the company.

A remarkable feature of the company's trading in recent years has been the continuing increase in the receipts from our weighing machines, which were last year £15,000 in excess of those for 1948. There can be no doubt that these machines provide a real service. Every effort is made to ensure their accuracy and reliability and so to merit the continued confidence of the public.

The amusement machine department, too, has shown a satisfactory improvement, and I am pleased to say that, in respect of both weighing machines and amusement machines, we have now been able quite substantially to execute the repairs and maintenance which were deferred owing to the war.

De-rationing of Sweets

As regards our vending machines, we were, of course, disappointed during 1949 by the fact that the de-rationing of confectionery proved to be such a temporary affair. We were ready to put into operation plans already made for the modernisation and renewal of our machines, but these we have had to defer. The problem, however, is one constantly in the minds of your directors, and you may be sure that when the time arrives, no avoidable delay will be incurred in re-establishing our nation-wide sale of confectionery through automatic machines.

The 16 weeks period of de-rationing did, of course, favourably affect the trading results of the group, through its chains of retail shops, and its chocolate manufacturing subsidiary, Reeves Limited. The ration during 1950 has already been increased from 4 oz. to 5 oz. per week, and if this is maintained, and if the present profit margins are left unaltered, I believe the company's trading during 1950 will be reasonably satisfactory.

I will now refer to the consolidated accounts, but will deal only with significant variations from the figures for the previous year. The net outlay on fixed assets was approximately £15,000, over £9,000 of which consisted of plant and machinery for our chocolate manufacturing subsidiary. The value of stocks at the end of the year remains very similar to the value at the end of 1948, being £5,416 less at £153,347.

The excess of current assets over current liabilities and provisions at £207,650 is £65,096 more than last year. This increase is represented, of course, by corresponding increases in depreciation and revenue reserves and in undistributed profits. The total current assets amounting to £407,993 are represented to the extent of £217,464 by investments and cash.

The net profit from trading and other receipts is £17,786 more than in 1948, but an increase of £3,082 in taxation and £2,937 in sundry other items leaves the net profit for the year £11,767 greater at £35,685. This has been dealt with as stated in the directors' report.

Once again it gives me very great pleasure to acknowledge the industry, efficiency, and loyalty of our General Manager, Mr. F. L. Timmins, and of the managers and staff, to whose efforts the satisfactory results attained are largely attributable. To my colleagues on the board, I extend my sincere thanks for their support and assistance during the year under review.

The report and accounts were adopted and the proposed dividend of 6 per cent. less income tax was approved.

Supplementary Reservists at Longmoor

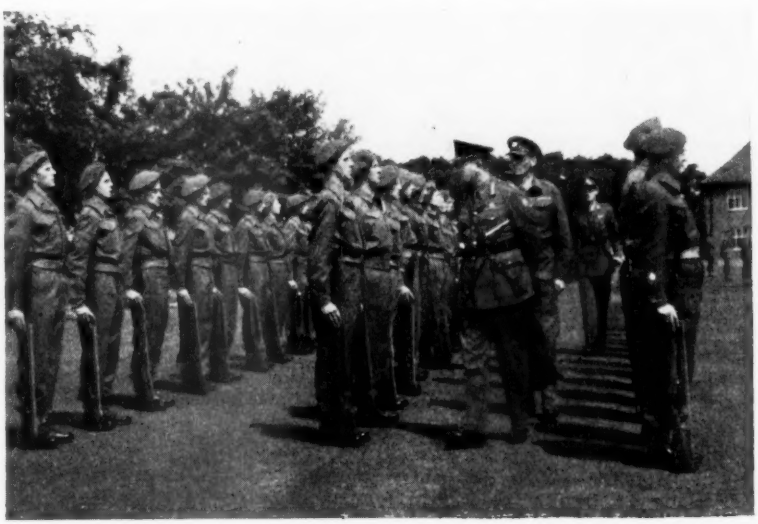
Inspection by G.O.C.-in-C., Southern Command, of 18 Railway Group at the Transportation Centre

On June 9, Lt.-General Sir Ouvry Roberts, G.O.C.-in-C., Southern Command, inspected about 250 men of 18 Railway Group, Royal Engineers (Transportation) Supplementary Reserve, who are undergoing their annual two weeks' military training at the transportation centre at Longmoor Camp, Hants.

The Group, which is recruited largely from the London Midland and Western Regions of British Railways, is commanded by Colonel C. R. L. Rice, who is District Motive Power Superintendent, Willesden, London Midland Region. The G.O.C., who was accompanied by Brigadier R. Gardiner, Director of Transportation and Commandant of Longmoor, was himself formerly a sapper and expressed his satisfaction at the turn-out of the men, despite the shortness of their training. 18 Group moves out of camp on June 17 and its place is taken by 19 Group, composed mainly of volunteers from the Eastern, North Eastern, and Southern Regions, which will be in training until July 1. From September 9 to 23 the camp will be occupied by 80 Railway Workshop Regiment and 155 and 156 Engineer Stores Squadrons.

The first week of the camps is given over to military training and the second week to technical training. This week, 18 Railway Group has had an exercise lasting from Tuesday to today, simulating war conditions. The men have operated the Longmoor Military Railway, which runs from Bordon to Liss, while paratroops and raiding parties have attempted to sabotage the line.

The Engineer-in-Chief, Major-General A. D. Campbell, is inspecting 19 Railway Group at Longmoor on June 23.



Lt.-General Sir Ouvry Roberts, G.O.C.-in-C., Southern Command, inspecting men of 18 Railway Group at Longmoor on June 9

Parliamentary Notes

Transport in Highlands and Scottish Islands

The problems of transport in the Highlands and Islands of Scotland were raised by Mr. J. Grimond (Orkney & Shetland—L.) on the motion for the adjournment of the House on May 24. He said that there were various plans in preparation for the development of those areas, but if they did not face up to the question of transport and freight charges, their efforts would would be wasted. Most of the coal was taken by sea, but some was taken by rail, and the charge for a ton of coal brought from the Midlands to Aberdeen was now 36s. 9d., and to Inverness about 38s. On top of that, in his constituency they had to pay 30s. freight to Kirkwall and 35s. from Aberdeen to Lerwick.

The freight for fertilisers from London to Mallaig was about 82s. 11d. a ton, and to Wick about 105s. a ton, or by sea from Leith to Kirkwall about £1 10s. 8d. a ton. Again, they had an additional 18s. 3d. a ton to the North Isles of Orkney, and 26s. 8d. to the North Isles of Shetland. The figure for mixed groceries—it was much higher if they were sent by passenger train—was over £14 a ton from London to Aberdeen and about £18 to Wick.

From Aberdeen to London, the freight for fresh fish was £8 14s. 7d., and from Mallaig about £14. From all the outer islands, from all the small islands of the Western Isles of Orkney and Shetland, additional rates had to be paid.

Those figures were largely due to the geographical nature of the islands and they all knew that railways and shipping lines had had to face great increases in operating costs. What he wanted to do was to stress the heavy burden which that laid on everyone who lived or traded in those areas. If there was any question of setting up a development area, that was one of the great handicaps under which any industry which came to that area must suffer. The only completely satisfactory solution was to have a flat rate for freight on the lines of the parcel post. If that was considered Utopian he suggested that some preferential rates for long-distance haulage must be given. He also drew attention to the fact that for some commodities, including fat cattle from Kirkwall to Aberdeen, a flat rate was paid, and, therefore, there was nothing in principle to prevent similar flat rates being brought in at least for commodities like coal, fish, and certain other agricultural products.

Sir David Robertson (Caithness & Sutherland—C.) maintained that, since the beginning of this century, and since the motorcar appeared on the scene, the railways had been running away from competition. In the early days they faced the competition from steamers; but the policy carried out by the "big five" when they took the place of the 120 railways, and still carried out by the nationalised railways, was fundamentally wrong. He put it to the Minister that 75 per cent. of the total cost of the railways was represented by costs incurred before they began to move a vehicle at all; the only way of recovering those costs was to run more trains with freight and more passengers. Instead of running five trains a day and charging £1 per head in fares, they could run 40 trains a day at 6s. 8d. per head and earn much more. The Road Transport Executive would then have a stiff task in competing with the railways. It would be better to run trains on a policy of abundance than a policy of restriction.

Mr. Alfred Barnes (Minister of Transport) said that during his period of office he had visited the Highlands and the North of Scotland probably more than the other parts of the country; and he was fully conversant with the problems raised. Mr. Grimond had emphasised that planned transport was essential. He would remind him that the present Government was the first Government since he had been in the House which had really tackled the essentials of the problem.

When they decided to nationalise transport, they produced a situation in which it was possible to begin to tackle a problem of that character. He could not give an assurance about the form or line that would take, but how could consideration of equalisation of rates, or flat rates, or preferential rates problems that were involved in long-distance transport from the North of Scotland, be approached adequately unless, and until, there was a body like the British Transport Commission, which through its principle of charges would enable it to resolve them or contribute to a solution of them? Whether it would proceed on that line of charges, he could not say, but he was certain that the steps taken in that direction had made a substantial contribution.

In the field of transport, road and rail must now be linked together, and he would remind Sir David Robertson that, due to the necessity for restriction of capital development now, the railways were not able to replace their pre-war rolling stock, let alone expand in the direction which Sir David Robertson had indicated.

Staff & Labour Matters

Railway Clerks' Sick Pay

The R.C.A., at its recent conference at Scarborough, voted, against the advice of its executive, in favour of a proposal to seek a decision in the Industrial Court on the deduction from salary of dependants' State allowances. The resolution affirmed that the principle of deduction from salary of the employee's sick-pay allowances only should be maintained, and deductions from salary of dependants' allowances should be fought. The President, Alderman Percy Morris, M.P., said that they had been legally advised that the matter could not be referred to the Industrial Court, but that on this understanding the executive of the R.C.A. would do its best to proceed with the motion.

Industrial Court Award

The Industrial Court has recently published its award (No. 2260) on a claim by the employees' side of the Railway Shopmen's National Council that the allowance of 12s. a week paid to Grade 1 fitters and Grade 1 electricians employed on outdoor machinery service work should be applied *pro rata* to all classes of skilled, semi-skilled, and unskilled workers.

After negotiations through the Railway Shopmen's National Council, when the application was declined by the employers' side, the matter was referred to the Industrial Court in accordance with the Act of 1919. The hearing took place in London on May 18, with Mr. G. G. Honeyman as Chairman of the Court, the other members being Mr. G. Maurice Hann and Mr. W. E. C. Lazenby.

The number of staff concerned is approximately 3,000, which, together with some 1,200 Grade 1 fitters and electricians who already receive an allowance of 12s. over their normal rate of 113s. a week in London and 110s. in the provinces, comprise the outdoor machinery, services staff.

The principal grades concerned, other than Grade 1 fitters and electricians, and their rates of pay are given in the following table:—

	London		Provinces	
	s.	d.	s.	d.
Bricklayer, Grade I	113	0	110	0
Carpenter, Grade I	113	0	110	0
Fitter, electrician, painter, etc., Grade II	108	6	105	6
,, Painter, Grade III	102	6	99	6
Painter, Grade IV	100	6	97	6
Smith, Grade I	113	0	110	0
Rigger	105	6	102	6
Assistants, mates, and helpers to craft grades	100	6	97	6
Assistants, mates, and helpers to other than craft grades ...	98	6	95	6
Labourers	95	6	92	6

The allowance which is paid to Grade 1 fitters and electricians employed on outdoor machinery work at ordinary time rates originated at a meeting of the Railway Shopmen's National Council on April 30, 1941, when it was agreed that a flat rate allowance of 4s. a week should be paid to such workers in recognition of the skill, adaptability, and qualifications which were required. This allowance was increased to 12s. a week with effect from November 1, 1948, by agreement of the Shopmen's Council.

In support of the claim the employees' side stated that, since no system of payment by results had been applied to the outdoor machinery services staff, the ordinary time rate represented the maximum which the men covered by the claim were able to earn within the length of the normal working week. It was contended that, having regard to the variety of the work, inconvenience of their employment, and the fact that in most other branches of the railway industry men employed on similar work were in receipt of either piecework earnings or lieu rates, there was justification for the claim.

It was submitted that in view of the importance of the work, together with the necessity for speedy and efficient repairs to appliances, and so on, there was no logical basis for the distinction in the rate of pay.

On behalf of the employers' side it was stated that Grade 1 fitters and electricians were fully trained all-round men who were required to work to a large extent without direct supervision, and were called on to use initiative to a greater degree than the other grades employed on this work. The factors which warranted the payment of the allowance to Grade 1 fitters and electricians were not present in the case of the other grades.

The Court, after considering the submissions, and having regard to the fact that Grade 1 fitters and electricians employed on outdoor machinery services work received an allowance, expressed the opinion that Grade 1 bricklayers, Grade 1 carpenters, and Grade 1 smiths when so employed should receive some allowance in excess of their normal rate, namely, 113s. a week in London and 110s. in other places.

The Court, therefore, has recommended the parties to assess the skill, adaptability, and qualifications required of each of these craftsmen and to determine by agreement the amount of the allowances to be paid to them. In the event of no agreement being reached within a period of six weeks from May 23, 1950, either party shall be at liberty to report such failure to the Industrial Court, and the Court will determine the matter.

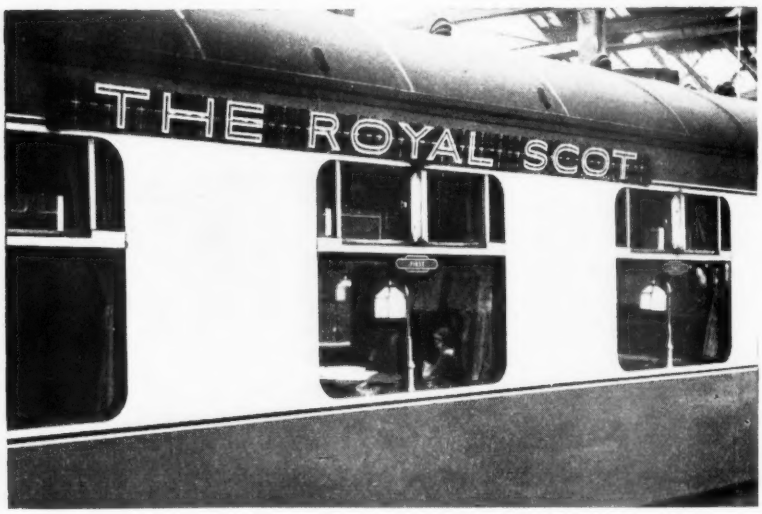
Except as provided above the Court found against the claim.

Notes and News

Technical Expert in Stores Work Required.—A technical expert in stores work is required by Iraqi State Railways for three years. See Official Notices on page 695.

Tenders Invited for Metre-Gauge Covered Goods Wagons for India.—The Director-General, India Store Department, 32, Edgware Road, London, W.2, invites tenders for the supply of metre-gauge "MC" type four-wheeled covered goods wagons. See Official Notices on page 695.

New Headboards for the "Royal Scot."—The locomotive hauling the "Royal Scot" express now carries a distinctive headboard, which embodies a Scottish lion on a yellow shield above the name. In addition, the roofboards on the coaches have been painted in the Stuart Royal tartan, with the lettering "The Royal Scot" superimposed. In the restaurant cars the menu cards are to be distinguished by a special "Royal Scot" emblem, and the staff will wear a similar device in the lapels of their jackets. A special sign, also incorporating a Scottish lion, has been erected over the entrance to platforms 12-15 at Euston Station to direct passengers to the express, and a similar sign is being provided at Glasgow (Central) Station.



Roofboards of the "Royal Scot" in Stuart Royal tartan

East African Railways Locomotives.—In the article entitled "Development of the Kenya & Uganda Railway" in our March 31 issue, the Garratt-type locomotive illustrated on page 365 was described as a Beyer-Garratt. It is, in fact, an "E.C.2" class Garratt locomotive, built by the North British Locomotive Co. Ltd. in 1931.

Canadian Locomotive - Fairbanks - Morse Agreement.—The Canadian Locomotive Co. Ltd. and the Canadian Fairbanks-Morse Co. Ltd. have concluded an agreement whereby the latter has bought a substantial stock interest in the Canadian Locomotive Co. Ltd. The agreement will enable Fairbanks-Morse to use the large, well-equipped plant of the Canadian Locomotive Co. Ltd. at Kingston, Ontario, which, as well as building diesel locomotives, will be capable of producing other Fairbanks-Morse products hitherto imported into Canada from the U.S.A.

Colonial Engineering Service.—Vacancies have occurred for assistant engineers (capital works) in the civil engineering branch of the Nigerian Railway. Candidates should preferably be under 40 years of age and be Corporate Members of the Institution of Civil Engineers or hold qualifications which exempt them from Sections "A" and "B" of the A.M.I.C.E. examinations. See Official Notices on page 695.

Rectifier Locomotive.—The Pennsylvania Railroad is to build two main-line freight electric locomotives in which a rectifier is to be installed, to convert the standard single-phase 11-kV, 25-cycle current to d.c. before feeding to series-type traction motors. There are to be twelve of these traction motors on each 6,000-h.p. twin-unit locomotive and they are to be fed through 24 ignition tubes. Locomotive weight will be about 295 tons, top speed 60 to 65 m.p.h., and length 122 ft. Westinghouse electrical equipment will be incorporated. See editorial article in this issue.

Scottish Motor Traction Capital.—Legal formalities associated with the capital plans of Scottish Motor Traction Company were virtually completed on June 7 when its petition was confirmed in the Court of Session in Edinburgh. The company is reducing its share capital from £2,750,000 to £1,247,011 by repaying the £1 million 6½ per cent. cumulative preference stock and cancelling and extinguishing the £502,989 ordinary stock held by the British Transport Commission. The board has powers to increase capital to its original level by the creation of 6,011,956 shares of 5s. each with no defined rights.

Dunlop Research Centre Opened.—A new research centre, which will serve as a research headquarters for the Dunlop Rubber Company and its 25 home and 16 overseas factories, was opened on June 7 at Fort Dunlop, by Sir Lawrence Bragg, Cavendish Professor of Experimental Physics at Cambridge University. The centre, established in a shadow factory where "Spitfires" were built during the war, comprises 50 fully equipped laboratories as well as a cinema and lecture theatre. The buildings stand in two acres of an eight-acre site and the main laboratory building is 129,000 sq. ft. in area. The organisation of the centre will include chemical and physical research divisions and sections dealing with engineering services.

Sheffield Twist Drill & Steel Company.—The London office of the Sheffield Twist Drill & Steel Co. Ltd., Sheffield, has been transferred from Thames House, Queen Street Place, E.C.4, to Terminal House, Lower Belgrave Street, S.W.1.

Eastern Region Stations Renamed.—The following stations of the Eastern Region have been renamed as shown: Wisbech Harbour (former M. & G.N. Jt. Station), as Wisbech Harbour North; Wisbech Harbour (former L.N.E.R. Station), as Wisbech Harbour East.

Accident Near Beattock.—Five persons were burnt to death when two coaches of the 11 a.m. express train from Birmingham to Glasgow Central caught fire near Beattock, Scottish Region, on the evening of June 8. The accident occurred on Harthope Viaduct, where the railway crosses over the main Glasgow-Carlisle road about six miles north of Beattock village.

Mechanical Handling Plant Sales Conference.—Steels Engineering Products recently gave a practical expression to its desire to support the drive for increased exports by inviting sales Agents from all parts of the world to discuss methods to increase yet further the sale abroad of mobile cranes and other mechanical handling plant. Some 80 delegates from 36 countries were present. The conference started on May 15 and lasted until May 25.

Railway Civil Engineering Exhibition.—Visitors to the Railway Civil Engineering Exhibition held at the Institution of Civil Engineering, Great George Street, S.W.1, from May 24 to June 3, numbered over 5,500, and included many overseas visitors. The heaviest day was Whit Monday, May 29, when there were nearly 2,000 visitors. Railway engineering staff were in attendance throughout the run of the exhibition and had many interesting discussions on technical matters with the visitors.

Booking Facilities from Main Glasgow Stations.—It is now possible to book tickets at any one of the main-line terminal stations in Glasgow for a journey starting from any of the four main city stations. First and third class ordinary single, return, monthly return, and day return tickets will be issued at Glasgow Central, Buchanan Street, Queen Street, or St. Enoch stations for journeys commencing at any of the stations mentioned. Tickets may be booked in advance.

Soap and Towel Facilities on Trains.—The Railway Executive is to increase the number of trains provided with liquid or tablet soap, and paper or cotton towels as more of these items become available. In October, 1949, twelve principal trains were equipped experimentally and to these have been added the boat trains between London (Euston) and Liverpool, and London and Southampton. Services which are to be brought under the arrangement as soon as possible are: "Capitals Limited," "Cornish Riviera," "Royal Scot," "Torbay Express," Plymouth boat trains (Paddington-Plymouth Docks), S.R. Continental boat trains, 10 a.m. Edinburgh (Waverley) to Aberdeen, 5.18 p.m. Aberdeen to Edin-

OFFICIAL NOTICES

His Majesty's Colonial Service

COLONIAL ENGINEERING SERVICE

VACANCIES have occurred for Assistant Engineers (Capital Works) in the Civil Engineering Branch of the Nigerian Railway. Candidates should preferably be under 40 and they should also preferably be Corporate Members of the Institution of Civil Engineers or hold qualifications which exempt them from Sections "A" and "B" of the A.M.I.C.E. examinations. They should have had some years' experience of railway civil engineering, particularly bridge work and some experience of reinforced concrete construction. The appointments will be on contract, for one tour in the first instance, at a point within the salary scale £830 per annum to £1,450 per annum (inclusive of expatriation pay). Salary will be determined by qualifications, experience and length of approved war service. A cost-of-living allowance of from £63 per annum to £110 per annum is payable in addition. Expatriation pay is payable on leave and other conditions of service include—free first class passages once each way each tour for the officer and his wife; assistance towards children's passages or education of up to £150 per annum; home leave on full pay at the rate of one week in the United Kingdom for each month of resident service; tours of eighteen months approximately; accommodation provided, usually a furnished house, at moderate rentals; outfit allowance on first appointment; gratuity on satisfactory termination of the contract at the rate of £25 (or of £37 10s. if the salary is over £1,000 per annum) for each three months of completed service, including leave periods. Intending candidates should apply at once, giving brief details of age, qualifications, experience and war service, and mentioning this paper, to the DIRECTOR OF RECRUITMENT (COLONIAL SERVICE), Sanctuary Buildings, Great Smith Street, London, S.W.1, quoting reference No. 27333/6/50.

Government of Iraq

TECHNICAL EXPERT IN STORES WORK required by Iraqi State Railways for three years. Salary according to qualifications and experience up to a maximum of I.D. 130 per month (1 Iraqi Dinar = £1 Sterling). Free passages. Furnished quarters available at moderate rent. Candidates not over 45 years of age, should have qualifications equivalent to A.M.I.Mech.E., but previous experience of railway storekeeping may offset lack of membership of professional bodies. The duties are mainly those of ordering of stores supervising local purchases and compiling stores vocabulary, but applicants must be prepared to take over the entire management of the stores department. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the CROWN AGENTS FOR THE COLONIES, 4, Millbank, London, S.W.1, quoting M/N/26107/3E on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.

WANTED for Peruvian Railways, Assistant Locomotive Superintendent, commencing salary £1,200, and Foreman for locomotive repair shop, commencing salary £800. Colloquial knowledge of Spanish essential.—Write Box "B.J." c/o J. W. VICKERS & Co. LTD., 7/8, Great Winchester Street, London, E.C.2.

RAILWAY MAINTENANCE PROBLEMS. By H. A. Hull (late District Engineer, L.M.S.R.). Valuable information. With much sound advice upon the upkeep of permanent way. Cloth, 8½ in. by 5½ in. 82 pp. Diagrams. 5*s*. By post 5*s*. 3*d*. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

THE Director-General, Railways, Karachi, Pakistan, invites tenders for the supply of 23 broad gauge (5 ft. 6 in.) main line express and goods Diesel Electric Locomotives for the North Western Railway (Pakistan). Tender documents, including instructions to tenderers, tender form, schedule of requirements, general and particular specifications and conditions of contract can be obtained from the Commercial Secretary, The Office of the High Commissioner for Pakistan, Supply & Stores Department, 40, Lowndes Square, London, S.W.1, between the hours of 10 a.m. and 4 p.m. Mondays to Fridays, on payment of Ten Pounds per set, which amount will not be refunded. Tenders will only be considered from those diesel electric locomotive manufacturers who have built diesel electric locomotives of the power and size required and which have been in service on railways and proved successful. Tenders from firms who do not fulfil these conditions will not be considered. Tenders are returnable in Karachi at the address given in the tender form by July 29, 1950, at 11 hours. The reference SS.4190 should be quoted on all applications for tender forms.

THE Director-General, India Store Department, 32, Edgware Road, London, W.2, invites tenders for the supply of

	Quantity
Metre-Gauge "MC" Type 4 Wheeled Covered Goods Wagons	1,000 Nos.

Forms of tender, which are returnable by 11 a.m. on August 17, 1950, may be obtained at the above address upon payment of a fee of 45s. Reference S.285/50 should be quoted in all applications.

INTERNATIONAL RAILWAY ASSOCIATIONS. Notes on the work of the various associations concerned with International traffic, principally on the European Continent. 2*s*. By post 2*s*. 2*d*. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

burgh (Waverley), 10 a.m. Glasgow to Aberdeen, 5.30 p.m. Aberdeen to Glasgow. With the introduction of the winter train service on September 25, the undermentioned services will also be included: "The Midlander" 11.5 a.m. Wolverhampton (H.L.) to Euston, 5.40 p.m. Euston to Wolverhampton (H.L.); "The Inter-City" 9 a.m. Paddington to Wolverhampton (L.L.), 4.20 p.m. Wolverhampton (L.L.) to Paddington.

L.M.R. Suburban Lines Poster.—The London Midland Region of British Railways has produced a diagrammatic map poster of its London suburban lines. The map is to be a permanent feature of the poster displays at the stations it deals with and one will be allotted to the station frontage, as well as to each platform. A feature of the map is a system of symbols at appropriate stations indicating sporting activities of the neighbourhood and whether a car park is available.

Pulverised Fuel Film Produced.—A preview of the film "Pulverised Fuel," produced for Babcock & Wilcox Limited, was held in the theatre of the Film Producers' Guild, Upper St. Martin's Lane, London, W.C.2, on June 9. The film starts with a brief history of pulverised fuel firing and its application to large boilers. Animated diagrams are used to show various designs of furnace burning coal with widely differing characteristics. A close-up of pulverising mills, control panels, and meters are included, which illustrate the automatic control system of the complete installation; starting up and operating technique is also demonstrated. The film deals with ash disposal and extraction of dust from flue gases. It is available on loan, free of charge, in either 35 mm. or 16 mm. size; the 16-mm. version requires a projector which will accommodate 1,600 ft. of film.

Pullman Train Day Tours.—On Wednesday, June 21, the first of a new series of Pullman train day tours to places of historic and topical interest will be run by the Southern Region of British Railways. Passengers will travel by Pullman car special from Victoria and on arrival at Rochester visits will be made to the castle and cathedral. A motorcoach drive will follow and from Rochester the journey will be made by train to Canterbury, allowing a 3-hr. visit to the cathedral and city. Further tours have been arranged to take place on Wednesdays, July 12 and 26, and August 9 and 23, and include visits to Salisbury, Winchester, Dover, Chichester, Southampton, Glastonbury Abbey and the Cheddar Gorge.

Lanarkshire Fair Holidays: Special Train Services.—British Railways announce that in connection with the Lanarkshire Fair Holidays direct special trains will be run today (Friday) and tomorrow (June 17) from a number of stations to Scottish and English holiday centres.

From Millwall to New Cross: 50 Miles.—A 94-ft. girder weighing more than 20 tons was lifted on to a British Railways lorry at Millwall, London, S.E., on May 31, for a 50-mile journey to New Cross, two miles away. The girder, one of three to be used in building a railway bridge at New Cross Gate over the Grand Surrey Canal, could not negotiate the curve of the Rotherhithe Tunnel, and so it was taken with a police motor cycle escort to Marylebone Station, where it was loaded on to a train.

Glasgow (St. Enoch) Station.—Since June 11 the Scottish Region Glasgow (St. Enoch) Station has been open on Sundays. The arrangement will operate during the summer months.

Commercial Travellers' Cloakroom Facilities.—As from June 1 a new standard arrangement for commercial travellers' cloakroom facilities has been in operation throughout British Railways. From that date a commercial traveller wishing to avail himself of reduced rates for depositing his luggage at railway stations has been able to obtain this concession on production of either a membership card of a recognised commercial travellers' association, a book of commercial travellers' railway vouchers, or a letter of identification, signed by him and his employer, certifying that he is a bona fide commercial traveller.

Bridge girder in transit from Millwall to New Cross (see paragraph above)

This new arrangement has superseded various practices hitherto operating on different parts of British Railways.

Road Haulage Association.—The annual luncheon of the Road Haulage Association will be held at Grosvenor House, London, W.1, at 12.30 for 1 p.m., on Thursday, June 29.

Scammell Lorries Limited.—The net profit for 1949 of Scammell Lorries Limited before tax of £103,411, against £147,443 in 1948, dropped from £283,179 in 1948 to £199,858. The ordinary dividend is to be maintained at 10 per cent.

Butler Machine Tool Co. Ltd.—At a board meeting of the Butler Machine Tool Co. Ltd., held at Halifax on May 24, the Directors resolved that a dividend on the 5 per cent. cumulative preference shares for the six months to June 30, 1950, be paid less income tax at 9s. in the £.

L.M.R. Stations Closed.—The London Midland Region Red Wharf Bay goods branch (Anglesey), from which the passenger service was withdrawn on September 22, 1930, was closed to all traffic on and from April 3 of this year. The two stations on the branch were Pentraeth and Red Wharf Bay & Benllech. As from May 15 Ditchford Goods Station (Wellingborough and Irthlingborough line) has been closed and from June 5 the following stations will be closed to passengers and all passenger train traffic: Pitsford & Brampton (Market Harborough and Northampton line); Deorham Bridge; Brayton; and Leegate on the Maryport & Carlisle line.

Pullman Incorporated Annual Report.—The report of Pullman Incorporated for 1949 shows a decline in Pullman-Standard freight car output which tapered off in the third quarter and practically came to a halt in the final quarter of the year. A total of 16,259 freight cars delivered by Pullman-Standard was 45 per cent. below the 1948 output. Orders were received for 2,235 cars as compared with 22,040 cars in 1948. Deliveries of new passenger vehicles, however, were a post-war record of 534 units, and included 310 sleeping cars. Total orders for new passenger stock amounted to 107 vehicles placed with all builders. The consolidated net income was $5,496,834, or $2.42 per share of stock outstanding at the close of the year, compared with $8,152,083, or $3.18 per share of stock outstanding in 1948. Dividends paid totalled $2 per share as in 1948.

Conference of Directors of European Industrial Federations.—The annual conference of the Directors of European Industrial Federations was held in London on May 23-26 at the invitation of the Federation of British Industries. Sir Norman Kipping presided. The proceedings were directed to various aspects of international co-operation and the machinery established to co-ordinate activities in different countries. The operations of the Organisation for European Economic Co-operation were reviewed, and also the methods adopted by the several Federations through the Council of Industrial Federations for maintaining contact with O.E.E.C. The reactions of the policy of liberalising trade on different national economies was examined and the further steps contemplated for promoting freer exchange of goods and for inaugurating a European Payments Union were considered. The conference also exchanged views on new methods for facilitating international investment and on the despatch of productivity teams to U.S.A.

Railway Stock Market

Moderate profit-taking in industrial shares and British Funds was in evidence early this week after the recent sharp gains in values, although markets generally remained active, and at the time of going to press renewed buying appeared to be developing. The re-assembly of Parliament and the controversy over the attitude of the Government to the Schuman plan for pooling European steel and coal production tended to make for caution. Moreover, belief that the Australian £ will be revalued, reports that France is planning to go on the gold standard, and rumours that by 1951 sterling may be made freely convertible into all other currencies, were among factors which affected sentiment. There are many indications that world trade is expanding and that the outlook is encouraging. Because of these factors the recent improvement in industrial shares seems justified. In many cases, however, the higher cost of raw materials and the upward tendency apparent in costs generally will offset the effect of increased turnover in export markets.

British Funds have been quieter; the small discount shown in initial dealings in the new 2½ per cent. Funding Loan came as a disappointment; nevertheless, long-dated stocks remained active, particularly 3½ per cent. War Loan, and 3 per cent. Transport (1978-88) was 90½. Terms of the British Coal stock issue have been eagerly awaited and it is expected that they will be announced in the course of this week.

Foreign rails were rather more active, although in most cases movements were small. United of Havana stocks suffered a set-back on unconfirmed reports of a hitch in the take-over negotiations; the 1906 debentures fell back to 25, while the Cuban 4½ per cent. debentures were back to 58½, and the 4½ per cent. Western debentures to 25½. Great Western of Brazil have held a rise to 146s. 9d. on expectations of a pay-out of at least 155s., but there were irregular movements in Leopoldina stocks, small buying or selling orders tending to affect prices somewhat sharply. The ordinary was 9¼, the preference 27, the 4 per cent. debentures eased to 92½, and the 6½ per cent. debentures to 132½. Leopoldina Terminal 5 per cent. debentures were 87½ and the ordinary units 1s. 7½d. Antofagasta ordinary and preference were 7¼ and 42 respectively. San Paulo 10s. units have been firm at 18s. 3d. and Brazil Rail gold bonds were 41¼. Manila "A" debentures kept at 86, and the preference shares stood at 8s. 3d.

Mexican Central "A" bonds were quoted at 35, Mexican Railway 6 per cent. debentures at 60, and National of Mexico 4½ per cent. non-assented bonds at 26. Nitrate Rails were held firmly and quoted at 75s., and Taltal shares at 17s. 6d. Central Uruguay changed hands around 10, Guayaquil & Quito 5 per cent. bonds were 29½, La Guaira Caracas ordinary 72, and White Pass Yukon income bonds transferred up to 70. Canadian Pacifics have been firm at 29½, and the debentures strengthened to 99¼.

Road transport shares remained firmly held, and sentiment was helped by the further financial results that have come to hand. Southdown eased to 115s., however, and Lancashire Transport to 78s. West Riding were 64s., and B.E.T. stock firmer at £440.

Iron and steels kept firm and were helped by the fresh record in steel production established during the past month. Terms of the John Summers debenture issue continue to be eagerly awaited because other important steel companies may make similar issues to finance expansion plans. It continues to be assumed that the John Summers debentures will have the right to early repayment should iron and steel be nationalised. The view now appears to be growing that a General Election is unlikely until next year, and that, in any case, even should the Government obtain a majority, iron and steel nationalisation is improbable until the year 1952.

Guest Keen have risen further to 46s. 1½d., and, although best prices were not held, Stewarts and Lloyds at 55s. 10½d., United Steel at 26s. 9d., and Beardmore at 44s. 3d. were higher on balance. Shares of locomotive builders and engineers were firm generally, although North British Locomotive eased to 17s. 10½d., Vulcan Foundry were 20s., Beyer Peacock 22s. 4½d., Gloucester Carriage & Wagon 50s., Wagon Repairs 16s. 7½d., Birmingham Carriage & Wagon 28s. 1½d., and Hurst Nelson 57s.

Traffic Table of Overseas and Foreign Railways

	Railway	Miles open	Week ended	Traffics for week: Total this year	Traffics for week: Inc. or dec. compared with 1948/49	No. of weeks	Aggregate traffics to date: Total 1949/50	Aggregate traffics to date: Increase or decrease
South & Central America	Antofagasta ...	811	4.6.50	£ 62.280	+ £ 16,960	22	£ 1,309,304	— £ 135,400
	Costa Rica	281	Apr., 1950	c852,959	— c156,386	43	c8,449,421	— c1,679,807
	Dorada	70	Apr., 1950	39,295	+ 9,554	17	165,766	+ 45,455
	Inter. Ctl. Amer. ...	794	Mar., 1950	$1,310,388	+ $114,029	13	$3,778,654	+ $493,309
	La Guaira	22¼	May, 1950	$99,200	— $4,255	22	$444,361	— $111,568
	Nitrate	382	31.5.50	15,158	— 4,890	21	194,106	+ 16,231
	Paraguay Cent. ...	274	2.6.50	₲235,276	+ ₲119,390	48	₲7,296,313	+ ₲2,288,892
	Peru Corp. ...	1,050	May, 1950	S6,674,000	+ S1,515,689	48	S64,334,058	+ S18,415,630
	,, (Bolivian Section)	66	May, 1950	Bs.9,171,000	— Bs.1,225,623	48	Bs.106,682,664	+ Bs.10,536,314
	Salvador	100	Febr., 1950	c239,000	— c72,000	35	c1,300,000	— c139,000
	Taltal	154	May, 1950	15,500	+ 4,000	48	154,420	+ 54,665
Canada	Canadian National†	23,473	Apr., 1950	14,659,000	+ 1,207,000	17	53,550,000	+ 1,549,000
	Canadian Pacific† ...	17,037	Apr., 1950	9,928,000	— 118,000	17	37,654,000	— 911,000
Various	Barsi Light* ...	167	Mar., 1950	34,522	+ 3,022	52	358,762	+ 22,275
	Egyptian Delta ...	607	10.4.50	17,780	— 2,730	1	17,780	— 2,730
	Gold Coast... ...	536	Mar., 1950	258,498	— 8,915	52	2,806,753	+ 154,946
	Mid. of W. Australia	277	Mar., 1950	33,778	+ 3,481	39	275,873	+ 15,568
	Nigeria	1,900	Jan., 1950	502,360	+ 38,978	44	5,017,814	+ 266,573
	South Africa ...	13,347	6.5.50	1,573,895	+ 64,586	8	7,980,595	+ 438,109
	Victoria	4,744	Feb., 1950	1,826,957	+ 342,160	35	—	—

* Receipts are calculated @ 1s. 6d. to the rupee

† Calculated at $3 to £1